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Family Economics and Nutrition Review

Volume 16, Number 1
2004

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Family Economics and Nutrition Review is published semiannually by the Center for Nutrition Policy and Promotion, U.S. Department of Agriculture, Washington, DC.

The Secretary of Agriculture has determined that publication of this periodical is necessary in the transaction of the public business required by law of the Department.

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Family Economics and Nutrition Review is for sale by the Superintendent of Documents. Subscription price is \$15 per year (\$21 for foreign addresses). Send subscription order and change of address to Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954. (See subscription form on p. 65.)

Original manuscripts are accepted for publication. (See "guidelines for submissions" on back inside cover.) Suggestions or comments concerning this publication should be addressed to Julia M. Dinkins, Editor, *Family Economics and Nutrition Review*, Center for Nutrition Policy and Promotion, USDA, 3101 Park Center Drive, Room 1034, Alexandria, VA 22302-1594.

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Front and Center

Making a Difference With Dietary Guidance: From Science to Promotion

The Center for Nutrition Policy and Promotion is committed to improving the health of Americans by not only developing dietary guidance that links scientific research to the nutrition needs of consumers but also by promoting that guidance. The nutrition-related research presented in this issue, as well as in other issues, is representative of one of the first steps needed to make a difference in people's overall health. This issue, for example, reports on research that examines factors influencing children's consumption of meals served in the Summer Food Service Program, factors affecting food security among first-time WIC participants, and contributors to food insecurity among rural families. The Center's update on healthful eating, as measured by the Healthy Eating Index, shows that most Americans' diets need to improve.

Continually updating the nutrition science, one of the hallmarks of the USDA, is complemented with reviews of and updates to dietary guidance. The review process for the Dietary Guidelines for Americans is based upon consensus science and results in recommendations of the Dietary Guidelines Advisory Committee, which consists of leading health and nutrition experts from across the country. This open process, designed and implemented by the USDA and the U.S. Department of Health and Human Services (HHS), uses the latest scientific and medical knowledge as well as national databases to develop guidance for the general public on ways to improve overall health through proper nutrition. Complementary to the review of the Dietary Guidelines is an evaluation and an update of the Food Guide Pyramid, currently referred to as the USDA's food guidance system. One major goal for revising this system is to provide tools that allow consumers to personalize food guidance so that they can live more healthful lifestyles.

Promoting dietary guidance is a major actionable strategy to be used by the USDA and its partners to help Americans make appropriate food choices. After the release of the Dietary Guidelines and the updated food guidance system in early 2005, guidance messages must be promoted effectively through multiple delivery channels to reach various audience segments. It will be through these important promotions that the USDA, in concert with HHS, will continue to build partnerships with the Nation's premier health and nutrition organizations as well as a broad array of nutrition professionals, nutrition educators, academia, and other health organizations to ensure that Americans not only have access to the messages of the Dietary Guidelines and the updated food guidance system but also acquire the ability to use them to make appropriate and long-term changes in their lifestyles.

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Children Rate the Summer Food Service Program

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Food waste has been identified as an issue in the Summer Food Service Program. National studies conducted to identify the cause have typically questioned only program administrators and parents, not the children. We sought to determine reasons for plate waste from the children's perspective. Plate waste was assessed by direct observation, nutrient content was evaluated, and children were asked what a typical lunch at home might be. Children graded the menus and participated in either focus groups or individual interviews. A total of 203 individual interviews and two focus groups were completed. Results showed that more traditional menu items such as peanut butter and jelly sandwiches received higher marks than did trendy items such as wraps, tacos, and pita sandwiches. Taste appeared to be the predominant factor influencing how children rated a meal. Using the National School Lunch Program as a basis of comparison, we found that the meals as served met most Federal nutrition guidelines, but meals as consumed fell short in calcium, iron, and vitamin C for selected age groups. Based on what children reported they might eat at home if not participating in the Summer Food Service Program, we found that 18 percent of the children reported lunch meals that could be evaluated as inadequate. Food waste was estimated to be 38 percent of calories overall or 32 percent excluding condiments. This study provides a unique perspective on strategies to reduce plate waste, increase meal consumption, and improve nutrient intake of the participants in the Summer Food Service Program.

The U.S. Department of Agriculture (USDA) administers a Summer Food Service Program that provides low-income children up to age 18 with nutritious meals and snacks when school is not in session (USDA, 2003). Meals are either prepared onsite or delivered by vendors to summer campsites, nonprofit organizations, and other agencies that offer summer programs for children. On an average weekday in the summer of 2002, over 3 million children were served (Food and Research Action Center, 2003). However, food waste and underutilization have been identified as issues in this program (Gordon et al., 2003). Although national studies have been conducted to identify the root causes, the researchers typically have questioned program administrators and parents. Based on a literature review, we found that no one has discussed with the children

what could be done to improve their consumption of these meals and why they might not be participating.

Background

While most of the American population is food secure, hunger and food insecurity continue to be a problem for nearly 13 million U.S. children (Center on Hunger and Poverty, 2002). The latest *Status Report on Hunger and Homelessness* by the U.S. Conference of Mayors found a 17-percent increase in requests for emergency food assistance among families with children in 2002 (U.S. Conference of Mayors, 2002). A recent survey by America's Second Harvest indicated that of the 23.3 million people they served in 2001, 9 million were children (Kim, Ohls, & Cohen, 2001). In Delaware,

49 percent of the members of households served by the Food Bank of Delaware are children. Of those, 80 percent were food insecure and 32 percent had experienced hunger (Food Bank of Delaware, 2003). Six percent of the clients of the Food Bank of Delaware said their children have had to skip meals because there was no money to buy food.

One of the objectives of *Healthy People 2010* is to increase food security among U.S. households and in doing so, reduce hunger (U.S. Department of Health and Human Services, 2000). The Summer Food Service Program helps to address the issue of child hunger. However, under-utilization is an ongoing problem. During the 2002 school year, 15 million children received free and reduced-price lunches on an average school day, yet only 3 million of these children were reached by the Summer Food Service Program (Food Research and Action Center, 2003). Although Delaware ranks sixth nationwide in program use, only 29 percent of 40,000 eligible children participate.

A 2002 report to Congress by the USDA's Economic Research Service (ERS) summarized a review of literature on plate waste in school nutrition programs and reported that almost 12 percent of calories from food served in the National School Lunch Program were uneaten (Buzby & Guthrie, 2002). This plate waste represents a direct economic loss of over \$600 million and does not include the value of lost nutrition and health benefits. Plate waste figures for the ERS report were derived primarily from a large, national representative study conducted in 1991-92. A more recent national study of the Summer Food Service Program specifically indicated that children wasted about one-third of the calories and nutrients served, with only 11 percent of meals

being consumed completely (Gordon et al., 2003). Thus, it is not surprising that program sponsors and administrators in Delaware have voiced concerns about plate waste and have endorsed further study to address the problem.

Student input has been suggested as a strategy to improve the quality, appearance, and acceptability of school meals (Buzby & Guthrie, 2002). While many schools have advisory committees that involve students, the effect of their efforts to reduce plate waste is unreported: No studies were found that reported children's input regarding the Summer Food Service Program. However, in the national Summer Food Service Program survey, site supervisors were asked to indicate their perceptions of children's food likes and dislikes (Gordon et al., 2003). They reported that pizza and ham sandwiches were the most liked meat/meat alternatives. Other favorites were chicken nuggets or chicken strips, hamburgers, and cheeseburgers. Chocolate milk was preferred 14 to 1 by children, according to site supervisors. The most disliked items were bologna sandwiches, followed by tacos and other Mexican-style entrees, roast beef, and fish.

One of the goals of the Summer Food Service Program is to provide nutritious meals and snacks. To ensure this, the regulations specify a meal pattern but not specific nutrient requirements. To evaluate the nutritional composition of the meals for this study, we adapted the standards of the National School Lunch Program as a basis of comparison. Over a week, the lunch meal had to provide, on average, one-third of the Recommended Dietary Allowance (RDA) for key nutrients including protein, calcium, iron, vitamin A, and vitamin C. Although nutrient standards are based on the 1989 RDA, our adaptation was modeled after a 2003 ERS evaluation of the Summer Food

Service Program in which the updated RDA and Adequate Intake (AI) values were used as bases for comparison (USDA, 2003). According to recommendations of the School Meals Initiative (USDA, 2001), the meals must meet the caloric needs of growing children, limit calories from fat to 30 percent or less, and limit calories from saturated fat to less than 10 percent (averaged over a week and not on a per-meal basis).

If meals are not consumed, no matter how well planned the menu, nutritional benefits are not obtained. However, even a partially consumed meal may increase a child's nutrient profile when compared with a potentially skipped or non-nutritious meal at home. The Summer Food Service Program meal pattern requirements are federally mandated, and a lunch meal must contain the following to be reimbursable: one serving of fluid milk (8 oz), two or more servings of vegetables and/or fruits (3/4 cup total), one serving of grains or bread (1/2 cup or 1 slice), and one serving of meat/meat alternative (2 oz) (USDA, 2002).

Federal reauthorization of the child nutrition programs is an ongoing process. To provide a rationale to maintain current funding levels, or advocate for increased funding, outcome evaluation is crucial. In today's economic climate, policymakers are looking more critically than ever at outcomes before authorizing Federal dollars for any programs. The purpose of our evaluative study was to examine under-utilization, nutrient outcomes, and plate waste in the Summer Food Service Program from the children's viewpoint. We also obtained some input from site supervisors. By collecting data on what a typical at-home lunch meal might be when children did not participate in the Summer Food Service Program, we

were able to make qualitative comparisons with the Summer Food Service Program meals. Information about at-home lunch meals was also intended to serve as a potential indicator of hunger.

Methods

Site Selection and Sample

The Food Bank of Delaware serves as one of the State sponsors of the Summer Food Service Program. A nutrient analysis was conducted on each day of its 2-week cycle menu¹ (10 days) and repeated to account for variations resulting from menu substitutions (N = 20 days).

Site selection was based on the participation of 50 children (a minimum) to ensure adequate sample size for interviews. All six urban feeding sites that met this criterion were used for the evaluation: four sites for individual interviews and two sites for focus group interviews. Each of the individual sites was visited for 5 consecutive days. The focus group interview sites were visited once. Site supervisors were contacted and invited to participate in the project. A \$50 gift certificate was offered, as an incentive to supervisors, for use in onsite activities. The project was conducted in only one of the three Delaware counties, because a second county had a sponsor other than the Food Bank of Delaware and the third county did not have sites large enough to meet the criterion for inclusion.

Data Collection

One interviewer collected all the data. The Summer Food Service Program site supervisor at each study site introduced the interviewer to the

children and explained the purpose of the visit. The interviewer was positioned near the waste cans so that as a child approached the can to discard the lunch bag, the interviewer could examine the bag for any remaining food items. Standardized portion sizes, defined by quartile (0, 1/4, 1/2, 3/4, 1), were used in recording estimated food intake and plate waste on a form developed specifically for the project. The children were then invited to participate in an interview about their lunch. Children of both genders (ages 6 to 15 years) participated.

One-on-one interviews, with the aid of a seven-item questionnaire developed for this project, were conducted to collect data on acceptability of foods served, alternative menu ideas, reasons for leftover foods, and types of foods that might be eaten for lunch at home. The children were told of the confidential nature of the interviews and of their right to decline to answer a question and to terminate the interview. Children were also told that declining to participate would not result in negative consequences for them. Interviews lasted for about 3 to 5 minutes each. Participant responses were recorded and analyzed by topic for common themes or patterns.

Focus groups, addressing similar questions to those in the one-on-one interviews, were conducted by a trained leader who used standardized procedures for conducting focus groups with children (Nabors, Ramos, & Weist, 2001; Heary & Hennessy, 2002). The focus group leader introduced herself and allowed the children to introduce themselves. The leader explained the purpose and procedures for discussing items, reminded the children that there were no right or wrong answers, and used a script/discussion guide to direct the sequence of the questioning. This technique was used to promote flexibility, because the

As with the rest of the population, taste appears to be the predominant factor for children in rating a meal highly and eating it. . . . Food quality . . . was also important.

¹Menu information available upon request from the authors.

group discussion was likely to flow naturally while the guide ensured that all important topics were covered and allowed unanticipated information to be obtained.

Audiotaping was the primary means of capturing focus group conversation. Content was analyzed by topic to extract meaning from the frequency and the manner in which topics were discussed. Common themes or patterns of commentary were identified independently by two investigators and coded as recommended by Morgan (1997).

Supervisors at each site were asked verbally whether they would like to comment on the food service and lunch items. The interviewer recorded supervisors' comments, as well as her general observations related to the lunch meal or service.

Data Analysis

The Statistical Package for Social Sciences (Version 6.14) was used to analyze the data. While frequency distributions and measures of central tendency were used to analyze demographic and organizational data, the Food Processor² (Version 7.8) was used to estimate nutrients in the menus and nutrients consumed, based on plate waste. Chi-square tests were used to test for association between mean ratings (by gender and age groups). The assigned significance level for all of these tests was 0.05. Qualitative information from interviews was used to present a different "face of reality." Transcribed tapes from focus group interviews and information recorded from scripted one-on-one interviews were used to interpret data, look for patterns, and make comparisons and contrasts with the quantitative data.

²The Food Processor computer software program allows quick and accurate dietary intake analysis and includes a comprehensive food database.

Table 1. Mean nutrient content of 20 days' menus served by the 2002 Summer Food Service Program of the Food Bank of Delaware, as a percentage of RDA/AI¹

Age/gender group	Carbohydrate RDA	Protein RDA	Vitamin A RDA	Vitamin C RDA	Calcium AI	Iron RDA
----- Mean percent -----						
Children						
4-8 years	65.1	144.8	161.8	131.4	54.1	33.8
Males						
9-13 years	65.1	80.9	107.9	73.0	33.3	42.3
14-18 years	65.1	52.9	71.9	43.8	33.3	30.7 ²
Females						
9-13 years	65.1	80.9	107.9	73.0	33.3	42.3
14-18 years	65.1	59.8	92.4	50.6	33.3	22.5 ²

¹While standards for school meals are based on the 1989 RDA, the evaluation in this study was based on the updated Dietary Reference Intakes. The AI was used as the nutrient standards for calcium because an RDA is not available.

²Did not meet one-third of the RDA.

Results and Discussion

Nutritional Analysis of Menus

Although a 2-week menu cycle was utilized, implementation exactly as planned did not occur. Substitutions were made almost daily because of production issues such as the availability of menu items or technical problems such as equipment breakdown. (For example, a malfunctioning refrigerator on one day led to spoilage of the entrée; thus, a substitution was made.) Therefore, the menus that were actually served (N = 20) were used for nutritional analysis.

Analysis of 20 days of menus revealed that, on average, the lunch meals—as served—met one-third of the RDA or Adequate Intake (AI) for all the required nutrients across all age and gender groups, with the exception of iron for the 14- to 18-year-old males and females (table 1). Whereas the mean percentage RDA/AI for all age and gender groups was 65 for carbohydrate, the mean percentages for protein ranged from 52.9 to 144.8; for vitamin A, 71.9 to 161.8; for

vitamin C, 43.8 to 131.4; for calcium, 33.3 to 54.1; and for iron, 22.5 to 42.3.

Actual mean nutrient consumption, based on 203 plate-waste observations of the 20 menus as served was below the recommended levels for both calcium and iron in both genders across each age group (table 2). In addition, vitamin C intakes were below the recommended levels for 14- to 18-year-old males and females, and protein intake was below recommendations for the males in this age group. While the quartile system of estimating intake may be thought to affect the nutrient composition data, the use of a single trained observer to collect the data should have limited the potential for this error.

Percentage of calories from fat in the menus—as served—(33 percent) exceeded the Dietary Guidelines recommendation of 30 percent maximum (table 3). Percentage of calories from saturated fat (11 percent) also exceeded the guideline; less than 10 percent. These recommendations are meant to be based on an entire day's calorie intake and not a single meal.

However, the School Meals Initiative requires that the weekly mean for the lunch meal meet this guideline. Actual consumption of calories ranged from 440 to 587 across the age groups (table 4). The wide discrepancy observed between the percentage of kcal consumed from fat by older males (18 percent) and females (41 percent) can be attributed to differences in food items that were wasted (e.g., boys tended to use less mayonnaise as a condiment).

Grading of the Menu

Children were asked to rate each different lunch menu based on a grading scale of "A" to "F": excellent to failing. "Grades" were coded on a 4-point scale: A = 4 points to F = 0 points. The menus, overall, were given a grade of B-. The lowest rating, a D+, was given to the meal consisting of a bologna and cheese sandwich; the highest rating, a B+, was given to the meal consisting of a peanut butter and jelly sandwich. Although the girls, compared with the boys, gave the meals a higher mean rating (2.79 vs. 2.74), the difference was not significant. Similarly, younger children (less than age 10) gave the menus a higher mean rating (5.76) than did older children (2.67), but the difference was not statistically significant (data not shown).

Personal Interviews

During the one-on-one interviews, children were asked how they liked the day's lunch meal, which food they liked best and least on that menu, why they did not finish the lunch if they had not, and what would they have had for lunch that day if they had eaten at home. Other comments were also solicited. The three top-rated menu items were apple juice, chocolate milk, and chicken nuggets. The three lowest rated menu items were carrots, wraps,

Table 2. Mean nutrient content of 203 meals consumed in the 2002 Summer Food Service Program of the Food Bank of Delaware, as a percentage of RDA/AI

Age/gender group	N	Carbohydrate RDA	Protein RDA	Vitamin A RDA	Vitamin C RDA	Calcium AI	Iron RDA
----- Mean percent -----							
Children							
4-8 years	82	44.0	100.6	64.8	66.6	31.7 ¹	23.8 ¹
Males							
9-13 years	73	40.7	53.8	40.8	40.9	20.2 ¹	27.3 ¹
14-18 years	7	41.1	29.7 ¹	56.1	24.0 ¹	20.7 ¹	16.9 ¹
Females							
9-13 years	38	41.4	50.0	53.5	46.6	16.4 ¹	27.5 ¹
14-18 years	3	52.6	41.3	49.1	4.1 ¹	12.6 ¹	17.8 ¹

¹Did not meet one-third of the RDA/AI.

and apples. Pitas were also disliked. The children said that the major reason for not finishing lunch (and hence contributing to plate waste) was their dislike of the foods served. Other reasons, though not cited as often, were feelings of fullness, lack of hunger because of medications, hot weather decreasing their appetite, and wanting to save foods to eat later. The children were asked, "What might you have had for lunch today if you didn't come here?" About 18 percent mentioned bread and mayonnaise, noodles, cereal with or without milk, a piece of fruit, or nothing.

Focus Group Interviews

The first focus group, consisting of four males and two females who were 8 to 14 years old, was conducted at a YMCA. After introductions and an ice-breaker activity, the children were asked to respond to a series of seven questions and were also allowed free-flow comments. The questions addressed the entire menu cycle, rather than any specific day. The children's favorite foods—from all the summer lunches—were chicken nuggets, tuna fish sandwiches, and fruit (specifically apples and bananas).

Table 3. Mean calorie, macronutrient content, and fat composition of 20 lunch menus served by the 2002 Summer Food Service Program of the Food Bank of Delaware

Characteristic	Amount
Kilocalories	668
Carbohydrate (g)	85
Protein (g)	28
Fat (g)	24
Saturated fat (g)	8.42
Monounsaturated fat (g)	7.49
Polyunsaturated fat (g)	3.1
Kcal from carbohydrate (%)	51
Kcal from protein (%)	16
Kcal from fat (%)	33
Kcal from saturated fat (%)	11

Table 4. Mean calorie and macronutrient content of 203 lunches consumed in the 2002 Summer Food Service Program of the Food Bank of Delaware

Age/gender group	N	Kilocalories	Cholesterol (g)	Protein (g)	Fat (g)	Kilocalories from		
						Cholesterol (%)	Protein (%)	Fat (%)
Children								
4-8 years	82	440	57	19	15	54	17	29
Males								
9-13 years	73	398	53	17	13	57	17	26
14-18 years	7	375	53	15	12	69	13	18
Females								
9-13 years	38	411	54	17	15	52	16	32
14-18 years	3	587	68	19	28	46	13	41

The food most disliked by the children was sliced beef because it seemed “raw.” Cheese on the sandwiches was viewed as being hard to remove if disliked, because it “stuck” to the bread. Bread was reported as being soggy at times; milk was reported as being “outdated” at times.

When the children were asked what they would like to see added to the menu, they mentioned the following items: cherries, chips, grapes, melon, fruit “leathers,” pizza, subs, granola bars, peanut butter and jelly with graham crackers, and hot meals. The children also suggested ways to improve the current menu items: pack sandwiches so they are not always squashed; be sure the milk is cold; include less cheese on everything, especially pitas; and always have dressing for vegetables.

Asked for their perspective on why some children did not come to the lunch program, the children said it was too hot to walk to the site, some parents did not have the money for camps, and some children did not like the food. When asked what could be done to attract more children to the program, the children said offer better menus and have the children who come (and like it) tell their friends about it.

A recent study of the National School Lunch Program concluded that children from two-parent households are more likely to participate than those from single-parent households (Dunifon & Kowaleski-Jones, 2003). This may also be a factor for States to explore. It has been suggested that single parents have less time and energy to learn about feeding programs. They may also have less information; thus, their children may not participate as much.

The second focus group was conducted at a summer performing arts program. Five females and two males who were 6 to 10 years old participated. The same protocol as described for the first focus group was used in conducting the second focus group. The children’s favorite foods among all of the summer lunches were peanut butter and jelly sandwiches, chicken nuggets, tuna fish sandwiches, and apples. Although apples were a low-rated item in the one-on-one interviews, small numbers in the focus groups might have accounted for this inconsistency.

The foods most disliked by the children were “anything that was soggy” (like the taco), squashed, or frozen (some of the sandwiches and the nuggets). Even tuna was frozen sometimes. The children stated that

the use of “so much ‘meat and cheese’ sandwiches” became boring. They also asked that marmalade not be sent for peanut butter and “jelly” sandwiches. Turkey sandwiches and tacos were also rated as disliked choices.

When asked what they would like to see added to the menu, the children mentioned the following items: macaroni and cheese; shrimp and lobster; fried chicken; barbecued chicken; vegetables such as peas, collard greens, celery, salads, broccoli, and tomatoes; and different fruit such as peaches, plums, grapes, cherries, or fruit cups. The children said that finding a way to warm the nuggets, packing sandwiches so they are not always squashed, being sure the milk is cold, and using less cheese on everything, especially pitas, would improve the current menu items.

The children were asked for their perspective on why some children did not come to the lunch program, or what could be done so that more children would come. Their only response was “serve more fried chicken and ribs.” No menu items were mentioned as being unfamiliar or never having been eaten before by either the first or second focus group.

Site Supervisor Comments and Interviewer Observations

The interviewer informally solicited site supervisors' comments about the meals or program in general by asking for any feedback they might like to provide. The main issues for the supervisors related to (1) maintaining appropriate food temperatures during holding periods and (2) other programs such as summer or Bible schools competing with the Summer Food Service Program.

Interviewer observations often paralleled the children's comments and related to food-quality issues such as the condition of the sandwiches or difficulty with service such as having children prepare peanut butter and jelly sandwiches themselves or the children not being able to peel oranges. The interviewer also noted that wraps were not well accepted by the children. Although interview observations are not typically included, we believed they provided an additional perspective to the evaluation for the program sponsor.

Conclusions and Recommendations

The children's responses regarding the Summer Food Service Program provided insight about their perspective on non-participation and unique insights into plate-waste issues and menu-item generation. As with the rest of the population, taste appears to be the predominant factor for children in rating a meal highly and eating it. This result is similar to Baxter, Thompson, and Davis's study (2000), which found that school lunch meals were likely to be consumed completely when children like the foods "a lot." Food quality (warm milk, soggy bread, squashed sandwiches, etc.) was also important.

The children we interviewed thought that serving foods that were tasty and well liked would be the key to increasing program participation.

The more traditional menu items, such as peanut butter and jelly sandwiches, received higher marks than "trendy" items such as wraps, tacos, and pita sandwiches. Chicken nuggets were popular, while bologna sandwiches were almost unanimously disliked. Chocolate milk was preferred over white milk. Thus, to reduce plate waste, it might be more advantageous to use a shorter menu cycle, such as 5 or 6 days and to rely on menu items that the children prefer. It might also be reasonable to obtain feedback from the site supervisors at the end of a 1-week cycle that could be used to determine which entrée items were the most well received.

Another idea might be to conduct some "taste panels" with the children or take them on field trips to vendor sites where the meals are prepared and solicit their feedback. This may foster a feeling of "ownership" for the lunch program and promote better acceptance of menu items. Menu ideas could also be solicited from local school lunch program supervisors. They may be a useful resource for providing insights into foods that are favored by school-aged children in their programs. The national study (Gordon et al., 2003) also suggests nutrition education might encourage children to eat more variety and encourage supervisors to improve menus to reduce plate waste. Attention should always be given to quality-control issues as well. Methods of packing sandwiches, thawing items, and temperature control need to be monitored.

The meals offered by the Food Bank of Delaware's Summer Food Service Program complied with the nutritional guidelines of the Federal program.

Nationally, about one-third of calories in the Summer Food Service Program are estimated to go uneaten. In the Delaware Summer Food Service Program, food waste was estimated to be 38 percent overall and 32 percent when condiments are excluded, thus supporting the national finding. However, only about 12 percent of calories in the National School Lunch Program are estimated to go uneaten, and this discrepancy between the two programs warrants further study.

In our sample, 5.4 percent of the children indicated that they would have had nothing to eat for lunch if they were not attending the Summer Food Service Program; another 12.2 percent would have had a nutritionally inadequate lunch if they had eaten it at home. Outreach to parents, particularly targeting single-parent families, with information regarding the program may help improve participation. To assist with Summer Food Service Program outreach efforts, the ERS³ has recently developed the Summer Food Service Program Map Machine, a Web-based tool to help States determine whether program sites are located in areas of highest need and to help identify underserved areas.

Considering children's taste preferences when developing menus for the Summer Food Service Program should lead to reduction in plate waste and may favorably influence participation. Other States might build upon our pilot study by adapting the tools⁴ we developed. Ongoing evaluation and monitoring of individual summer food service programs is always warranted in a continual effort to minimize plate waste and maximize program participation.

³www.ers.usda.gov/data/sfsp.

⁴Available upon request from the authors.

Acknowledgments

This project was made possible by a grant from the University of Delaware and with the participation of the Food Bank of Delaware.

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Factors Protecting Against and Contributing to Food Insecurity Among Rural Families

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The goal of this study was to understand better how the level of human resources and the diversion of financial resources away from food are related to the food security status of rural low-income households. A sample of 316 families with children and annual household incomes of less than 200 percent of the Federal poverty line was recruited from 24 rural counties in 14 States. For this study, face-to-face interviews were used to collect quantitative data. Results showed that the mothers who used a greater number of food and financial skills (managing bills, making a budget, stretching groceries, preparing meals) were more likely to have food-secure households, compared with the mothers who used fewer of these skills. Results also revealed that maternal symptoms of depression and reported difficulty paying for medical expenses were related to increased risk of food insecurity. The results are of interest to policymakers and program managers who address food security issues in rural areas of the United States.

Food insecurity and hunger of nationally representative samples of the U.S. population have been assessed annually since 1995 as part of the Current Population Survey (CPS). For the year ending September 2001, the prevalence of food insecurity in nonmetropolitan¹ households was 11.5 percent, compared with 7.7 percent in metropolitan households

outside central cities (Nord, Andrews, & Carlson, 2002). Nationally, 10.7 percent of all households (11.5 million) were food insecure during this period: 7.4 percent (8 million), food insecure without hunger; and 3.3 percent (3.5 million), food insecure with hunger. Food insecurity occurs “whenever the availability of nutritionally adequate and safe food or the ability to acquire acceptable foods in socially acceptable ways is limited or uncertain” (Anderson, 1990, p. 1560). Hunger, a narrower and more severe form of deprivation, is defined as “the painful or uneasy sensation caused by a lack of food” (Anderson, 1990, p. 1560).

Rural areas have some unique characteristics affecting food availability and acquisition that might contribute to the higher prevalence of food insecurity in nonmetropolitan areas—including the limited number of supermarkets, limited availability of food items, and high relative costs of food (Morris, Neuhauser, & Campbell, 1992). Thus, one might expect that families in rural areas

¹Nonmetropolitan and metropolitan areas are defined by the Office of Management and Budget (OMB). In 2003, OMB defined metro areas as (1) central counties with one or more urbanized areas and (2) outlying counties that are economically tied to the core counties as measured by work commuting. Outlying counties are included if 25 percent of workers living in the county commute to the central counties or if 25 percent of the employment in the county consists of workers coming out from the central counties—the so-called “reverse” commuting pattern. Nonmetro counties are outside the boundaries of metro areas and are further subdivided into two types: micropolitan areas, centered on urban clusters of 10,000 or more persons and all remaining “noncore” counties (USDA, 2004).

with greater skills in managing money and in accessing alternative food sources would be better able to meet their food needs and be more food secure than would be those with comparable incomes who lack these skills. Stronger and more geographically proximate extended family ties in rural areas might mitigate food insecurity. Lower costs of housing, typically the largest share of the family budget, might free more financial resources for food acquisition, thus decreasing food insecurity in rural areas.

In 1993, Rank and Hirschl showed that qualified families in rural areas were much less likely to participate in the Food Stamp Program than were urban families because of their negative attitudes toward welfare and lack of information about such programs. McConnell and Ohls (2002) reviewed survey and focus group data on participation in the Food Stamp Program by urban, suburban, and rural populations to determine whether particular barriers to program participation existed for rural households. These researchers found that a lack of understanding or awareness of eligibility was greater among rural food-stamp-eligible individuals, compared with their urban counterparts. Few investigators, however, have closely examined families' knowledge about community resources, including food assistance programs, as a factor protecting against food insecurity.

Using 1995-99 CPS data from non-metropolitan counties, Nord (2002) found no significant change in food insecurity and hunger across the period among low-income families (i.e., those with incomes that were less than 130 percent of the poverty level) receiving food stamps. But he did find that among low-income families not

receiving food stamps, food insecurity increased significantly: from 19.6 to 23.9 percent. This finding could indicate a protective effect that participation in the Food Stamp Program has against food insecurity in nonmetropolitan counties.

Previous research in a rural, upstate New York county showed that several household factors were related significantly to food insecurity: measures of wealth (i.e., having savings and owning a home), economic security and income-earning potential, financial resources for food acquisition (i.e., money to buy food), and access to "free" food from employers or Mother Nature (Olson, Rauschenbach, Frongillo, & Kendall, 1997). This previous research was not designed, however, to examine closely the key influences on food acquisition in Campbell's (1991) conceptualization of food insecurity and its risk factors: the human resources of households and the extent to which nonfood expenditures divert financial and human resources from food acquisition. Human capital theory (Becker, 1993) suggests that having human resources such as health, knowledge, and skills may protect against adverse outcomes such as food insecurity.

The research reported here explores the influence of two sets of factors on the food security status of a household: (1) the human resources of a household and (2) the diversion of financial resources from food acquisition. The goal is to identify characteristics of food-insecure rural households and household members.

Methods

Study Sample

The sample consisted of 316 rural low-income families from 24 counties in 14

States (fig. 1). These families participated in the first wave of the multi-State project, NC-223, "Rural Low-Income Families: Tracking Their Well-Being in the Context of Welfare Reform." Most of the counties (80 percent) had Rural-Urban Continuum Codes (RUCC 6, 7, or 8) (Butler & Beale, 1994). Codes 6 and 7 indicated they were nonmetropolitan with an urban population of 2,500 to 19,999. Code 8 counties were completely rural with no village of 2,500 or more people. Researchers in each State used the purposive selection method to choose one or two counties with these RUCCs. In several States, counties coded as 6, 7, or 8 were not available for study: In California, researchers chose two counties in the Central Valley that did not have a nearby urban center of more than 10,000 people. In New York and Massachusetts, researchers included the rural areas of one nonmetropolitan county with a RUCC of 4, which indicates an urban population of 20,000 to 50,000.

In each county, NC-223 researchers recruited families from programs that serve low-income people, for example, the Food Stamp Program, Head Start, the Supplemental Nutrition Program for Women, Infants, and Children (WIC), welfare-to-work programs, and migrant-worker programs. In almost all counties, educators in the Cooperative Extension Service assisted with recruiting participant families. To be eligible for participation in the study, families had to have annual household incomes at or below 200 percent of the Federal poverty line and at least one child 12 years old or younger. Within each county, families were selected purposively to represent the diversity in the types of families with children who would be affected by welfare reform. If two counties in each State were sampled, 15 families (a minimum) in each county were

sampled. If only one county was sampled, 20 families were sought. We believe this approach to sampling is appropriate for the purposes of the research reported here.

Design and Data Collection

The NC-223 project is based on a post-positivist paradigm (Guba & Lincoln, 1994), one that places special emphasis on collecting rich data in naturalistic settings and on soliciting participants' perspectives about their situation. Thus, in 2000, both in-depth qualitative and quantitative data were collected from the mother in each household. Only the quantitative results are reported here. Trained interviewers, using a semi-structured questionnaire, conducted the interviews in English or Spanish. These tape-recorded interviews, each lasting from 1-1/2 to 2 hours, were conducted primarily in the participants' homes; some were conducted in private rooms and offices in community agencies. The questionnaire consisted of items in these major areas:

- Household size and composition
- Perceptions of the community where the participant lives
- Knowledge of community resources
- Employment and current work situation for self and partner
- Work history
- Transportation
- Child care
- Family of origin
- Family well-being
- Life skills
- Education
- Income, expenses, and assistance received
- Food security
- Health of adults and children in the household
- Mental health (depression) of participant
- Parenting

Figure 1. States included in the study sample (shaded)



Trained and experienced project personnel at Oregon State University coded all data and entered them into SPSS (version 10.1).

Measures and Variables

The outcome of interest in this study was food security status, a binomial categorical variable: food insecurity versus food security. Food security status was assessed by using the 18-item U.S. Household Food Security Survey Module (Hamilton et al., 1997). Nord (2001) evaluated the data for scalability and recommended that standard scoring procedures were appropriate. Following the guidelines from the U.S. Department of Agriculture (USDA) for scoring responses, we classified any participant giving an affirmative response to at least three of the Module questions as being food insecure (Bickel et al., 2000).

Four primary predictors of food insecurity were studied: (1) chronic health conditions, (2) food and financial skills, (3) knowledge of community resources, and (4) participation in the Food Stamp Program.

These predictors were based on Campbell's (1991) conceptual framework of food insecurity and Becker's (1993) theory of human capital.

A chronic health conditions index was created by using 16 of the 17 chronic health conditions used by Sturm and Wells (2001) in their research on obesity and health. The health variables available in the data set and included in the index were heart problems, high blood pressure, diabetes, cancer, digestive problems, liver problems, hepatitis, asthma, kidney problems, eye or vision problems, back problems, chronic pain, permanent disability, reproductive problems, migraines/headaches, and arthritis. One point was assigned to each chronic health condition that subjects reported having.

The food and financial skills index was created by summing 4 of the 25 items on the life skills assessment: ability to manage bills, ability to make a family budget, ability to stretch groceries to the end of the month, and ability to prepare a well-balanced meal (Richards, 1998). Because the distri-

bution of scores was skewed toward the higher end, this index was transformed into a categorical variable. Those subjects who reported being skilled in two or fewer of the four areas were classified as having a low skill level. Those who possessed three of the skills were classified as having a medium skill level, while those who were able to perform all of the skills were classified as being highly skilled.

Knowledge of community resources, a continuous variable in the form of a percentage, was the proportion of the 22-item section on knowledge of community resources that was answered affirmatively (Richards, 1998). The tool includes items such as, "Do you know how to find a family doctor?" and "Do you know how to apply for food stamps?"

Participation in the Food Stamp Program was used as a measure of a family's participation in Federal food assistance programs because nearly all families were theoretically eligible. Participation was expressed as a simple binomial categorical variable. If the family received food stamps at the time of the interview, the family was considered a program participant. Participation in several other Federal food assistance programs with age restrictions and food stamp benefit level were also examined (e.g., the National School Lunch Program and WIC).

In addition to these four main predictors, we included other variables found to be associated with either food security status or one of the four primary predictors:

- Age of mother
- Self-reported race/ethnicity: non-Hispanic White, Hispanic/Latina, African American, and other
- Education: high school or less and more than high school

- Employment of mother: several measures including whether she was employed, whether the work was full- or part-time²
- Health insurance coverage: yes or no
- Type of insurance
- Housing situation: owning, renting, and other
- Problems paying for medical care: yes or no
- Annual household income expressed as percentage of the Federal poverty line: less than 100 percent, 100 to 130 percent, 130 to 185 percent, and greater than 185 percent.

We also included a measure for symptoms of depression and region of residence. The measure for symptoms of depression was the Center for Epidemiological Studies Depression Scale, used widely in population surveys and known as the CES-D (Radloff, 1977). The depression measure was expressed as a continuous variable, which was derived by summing the scores from 0 (rarely or none of the time) to 3 (most of the time) for the 20 items. Anyone with a score of 16 or higher was classified as being at risk for clinical depression. The scale had a Cronbach's alpha of 0.89 in this sample. To account for the differences in the prevalence of food insecurity across States, we created a four-category variable to designate region of the country:

- East—Massachusetts, New Hampshire, and New York
- South—Kentucky, Louisiana, and Maryland
- Midwest—Indiana, Michigan, Minnesota, Nebraska, and Ohio
- West—California, Oregon, and Wyoming

²Employment status includes whether the mother was employed full- or part-time, the type of job, rate of pay, and number of hours worked per week.

The sample had a fairly high level of food and financial skills, with almost three-fourths (72 percent) classified as having the highest skill level and only about 10 percent classified as having a low skill level. The proportion in each group who were food insecure differed dramatically, 42 versus 83 percent, respectively.

Because we found a statistical interaction between education and ethnicity, a binomial variable with two categories was created: (1) all non-Hispanic Whites (regardless of educational level) plus minorities who did not have education beyond high school and (2) minorities who had education beyond high school.

Data Analysis

Simple tests of chi-square or difference of means were used to screen the many variables and to determine which were significantly associated with food security status at the $p \leq 0.10$ level. The result: We found that chronic health conditions, life skills, knowledge of community resources, and participation in the Food Stamp Program were each related to food security status. However, the amount of food stamp benefit and participation in other food assistance programs, such as WIC and free or reduced-price school lunch, were not significantly associated with food security status.

Next, we identified and evaluated variables that might confound the relationship of each of the four predictors to food security status. We defined a significant relationship to be anything with $p \leq 0.10$, and we retained the variable in the analysis. To maximize the likelihood of identifying and correctly modeling the confounding variables, we created four separate binary logistic regression models of food insecurity, one for each of the four main predictors, and examined all two-way interactions. We removed variables from each model based on their significance and effect on the Nagelkerke R^2 . We retained variables that were significant at the $p \leq 0.05$ level or were part of a significant interaction at the $p \leq 0.05$ level. These variables greatly increased the R^2 when included in the regression models.

Table 1. Mothers in rural low-income households: Characteristics of the sample, proportion food insecure, and risk of food insecurity, 2000

Risk factors and protectors	Characteristics	Food insecurity	
		Status	Risk
	<i>Percent</i>	<i>Percent</i>	<i>Odds ratio¹</i>
Mean chronic health conditions score ²			1.12
Greater than 1.98	-	54.2	-
Less than 1.98	-	44.1	-
Food and financial life skills			
Low	9.5	83.3	Reference group
Medium	18.4	58.6	0.23*
High	72.2	42.1	0.14**
Mean knowledge of community resources ²			0.70
Greater than 77.25	-	47.7	-
Less than 77.25	-	51.2	-
Participation in Food Stamp Program			
No	48.1	44.1	Reference group
Yes	51.9	53.7	1.12
Ethnicity			
Non-Hispanic White	69.9	53.8	Reference group
Hispanic/Latina or Latino	17.1	48.1	0.77
African American	7.3	17.4	0.44
Other	5.7	33.3	0.41
Education			
High school or less	57.6	55.0	Reference group
Education beyond high school	42.4	41.0	0.99
Ethnicity and education interaction			
White or non-White with high school or less	87.0	53.8	Reference group
Non-White with education beyond high school	13.0	17.1	0.17**

(continued)

Once we had an acceptable model of food insecurity for each of the four primary predictors, we combined the four models into one model. We modified this model in the same way we modified the individual models, as described earlier. In addition, we added the measure of household income (percentage of poverty level), which was not in any of the four individual models.

Results and Discussion

Overall, 49 percent of the 316 households in the sample were food insecure. The prevalence in this sample is comparable to the prevalence in the 1999 CPS sample of low-income nonmetropolitan households with children who were receiving food stamps (Nord, 2002). The majority of mothers in the households had one or more chronic health conditions, with only 23 percent reporting that they

Table 1 (continued). Mothers in rural low-income households: Characteristics of the sample, proportion food insecure, and risk of food insecurity, 2000

Risk factors and protectors	Characteristics	Food insecurity	
		Status	Risk
	<i>Percent</i>	<i>Percent</i>	<i>Odds ratio</i>
Housing status			
Own	19.9	33.3	Reference group
Rent	61.4	57.2	3.44**
Other	18.7	39.1	1.64
Problems paying for medical care			
No	72.2	42.5	Reference group
Yes	27.8	66.1	3.20**
Mean score on depression scale ²			1.03**
Greater than 17.36	-	60.4	-
Less than 17.36	-	40.1	-
Percent of poverty line			
<100%	63.9	50.0	Reference group
≥100% and <130%	18.4	46.6	1.15
≥130% and <185%	12.3	41.0	0.91
≥185%	5.4	64.7	2.08
Region			
East	21.5	66.2	Reference group
South	20.3	34.4	0.28**
Midwest	35.1	46.0	0.50
West	23.1	50.7	0.63

¹Odds ratios determined from a single logistic regression model that included all the variables listed. The model had a Nagelkerke R² of 0.38 and 75 percent of cases classified correctly.

²For the continuous variables, the sample was divided at the mean, and the proportion of those above the mean who were food insecure is shown first followed by the proportion below the mean who were food insecure: 1.98 for chronic health conditions, 77.25 for knowledge of community resources, and 17.36 on the depression scale.

*p < 0.05.

**p < 0.01.

n = 316.

- not applicable.

had no chronic health conditions (data not shown). Households in which the mother had more than the mean number (1.98) of chronic health conditions were more likely to be food insecure than those with fewer health conditions (54 vs. 44 percent) (table 1).

The sample had a fairly high level of food and financial skills, with almost three-fourths (72 percent) classified as having the highest skill level and only about 10 percent classified as having a low skill level. The proportion in each

group who were food insecure differed dramatically, 42 versus 83 percent, respectively. Overall, this sample had a high level of knowledge about community resources, and the proportion who were food insecure did not differ greatly between those above and below the mean (77.25). Fifty-two percent of the sample participated in the Food Stamp Program at the time of the interview in 2000. Only 5 percent of the sample had household incomes greater than or equal to 185 percent of the Federal poverty line, but nearly

While the number of chronic health conditions was not a significant predictor of food insecurity in the multivariate model, two other health-related variables emerged as significant: having difficulty paying for medical expenses and symptoms of depression.

65 percent of this group was food insecure.

Food and financial skills and knowledge of community resources were each significantly protective against food insecurity ($p < 0.05$) in separate logistic regression models. Those with a high level of food and financial life skills were only one-eighth as likely to be food insecure, compared with those with a low level of skills. Receiving food stamps was protective against food insecurity, but the relationship was not significant ($p = 0.11$). The number of chronic health conditions was significantly and positively associated with increased risk of food insecurity ($p < 0.05$) (data not shown).

When all four primary predictors were considered in a single multivariate regression model, only food and financial skills remained statistically significant. While the number of chronic health conditions was not a significant predictor of food insecurity in the multivariate model, two other health-related variables emerged as significant: having difficulty paying for medical expenses and symptoms of depression. These results tend to indicate that it is the difficulty of paying for the medical care needed for chronic health conditions and the effect of these conditions on mental health that are related to food insecurity rather than the chronic health conditions themselves. This sample demonstrated a high prevalence of being at risk for clinical depression, with 60 percent scoring above the mean that was in the range of clinical depression (score ≥ 16).

In the multivariate regression model, only one significant interaction was found: Being non-White and having higher education emerged as a protective factor against food insecurity. Additionally, owning a home versus renting was a significant protective factor against food insecurity. The first

may be indicative of higher levels of human capital. The latter may be indicative of decreased diversion of financial resources away from food acquisition. Having difficulty paying for medical expenses, mentioned earlier, may also indicate a diversion of financial resources away from food acquisition. An unexpected finding was a significantly lower risk of food insecurity among research participants from the South.

Conclusions and Policy Implications

Food insecurity was common in this sample of rural low-income families with children residing in 14 different States across the United States. Nearly half of these families were food insecure, as measured by the USDA CPS food security survey questionnaire. After controlling for confounding factors, we found that families with the following characteristics were more likely to be food insecure:

- Lower levels of food and financial skills held by the mother
- Higher levels of depressive symptoms in the mother
- Difficulty paying for medical care
- Less than a high school education among non-White participants
- Not owning a home

These findings point to the importance of enhancing the human capital among the poor who reside in rural areas.

Formal and informal education in specific areas of life skills appear to be important avenues for promoting food security. The Expanded Food and Nutrition Education Program of the Cooperative State Research, Education, and Extension Service of the USDA and the Food Stamp Nutrition Education Program of the

Food and Nutrition Service of the USDA have the potential to affect the education of the rural poor through better targeting of the services and appropriate program adaptations to rural areas where the costs of operating such programs may be higher. Poor health, both physical and mental, is a major factor in the ecology of food insecurity in rural areas. The provision of health care at an affordable cost, for mental health problems and for physical disabilities, is central to promoting food security in rural areas of America. Coherent national and State-level health policies, including Medicaid, that recognize the unique nature of delivering comprehensive, quality health care in a rural environment are needed.

Acknowledgments

This research was supported in part by USDA/CSREES/NRICGP Grant Number 2001-35401-10215 and the Hazel E. Reed Human Ecology Extension Chair in Family Policy at Cornell University. Data were collected in conjunction with the cooperative multi-State research project, NC-223, Rural Low-Income Families: Monitoring Their Well-Being and Functioning in the Context of Welfare Reform. Cooperating States were California, Indiana, Kentucky, Louisiana, Massachusetts, Maryland, Michigan, Minnesota, Nebraska, New Hampshire, New York, Ohio, Oregon, and Wyoming. In addition to the authors, members of the Food Security Work Group who participated in the research and preparation of this manuscript are Jean Bauer, Bonnie Braun, Martha Lopez, Sheila Mammen, Leslie Richards, Josephine Swanson, and Karen Varcoe. The authors gratefully acknowledge the assistance of Emily Miller in conducting statistical analysis and Mark Nord for his helpful review of an earlier draft of this paper.

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The Effect of the WIC Program on Food Security Status of Pregnant, First-Time Participants

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Using a prospective repeated measures design, we assessed changes in the food security status of 313 pregnant, first-time participants in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) and the effect of the program on specific spending patterns. Food security status was determined by using the U.S. Food Security Survey Module at entry to the WIC Program during each participant's first trimester, third trimester, and at 3 to 6 months postpartum. We collected both quantitative and qualitative data to explore possible determinants or modifiers of changes in food security status. Food insecurity characterized 112 of study participants' households at baseline and decreased by half, to 56 households, at the end of the year of WIC participation. Within the subgroup of initially food-insecure participants, analyses were conducted to explore factors related to improvements in food security status. Controlling for a number of relevant factors, we found that women who had at least a high school education and were enrolled in Medi-Cal during the postpartum period were likely to become food secure. Qualitative results revealed that participants most often used the additional food dollars made available through the WIC food package to purchase higher quality foods and items needed for their newborns and to pay bills. Overall, these data suggest that the WIC Program makes a significant contribution to reducing food insecurity among first-time program participants and suggest the need to consider food insecurity as a risk criterion for the WIC Program.

The literature on household food security in the United States has grown substantially in recent years, at least partially due to the availability since 1995 of a standardized instrument for assessing this phenomenon in the population (Hamilton et al., 1997). The food security status of participants in the Food Stamp Program (Gundersen & Oliveira, 2001; Perez-Escamilla et al., 2000), the Expanded Food and Nutrition Education Program (EFNEP) (Greer & Poling, 2001), and welfare programs (Borjas, 2001; Capps, Ku, & Fix, 2002; Winship & Jencks, 2001) has been investigated. There have been only a few studies on the influence of the effect of the U.S. Department of Agriculture's (USDA) Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) on food

security status. A Florida study found that participation in WIC and the number of different income sources were the two factors most highly associated with more weekly family food servings and improved food security (Taren, Clark, Chernesky, & Quirk, 1990). A large improvement in diet quality, and therefore indirectly food security, was demonstrated in an analysis of data from the 1989-91 Continuing Survey of Food Intakes by Individuals (1989-91 CSFII) that examined the relationship between WIC participation and dietary intake. Participation in the WIC Program by at least one family member was shown to raise the aggregate household Healthy Eating Index (HEI) score by 23.45 points in a sample of 1,438 WIC participants, compared with households that did not participate in the WIC

Program (Basiotis, Kramer-LeBlanc, & Kennedy, 1998).

The underlying premise of WIC is that low income predisposes individuals to poor nutritional status and poor health outcomes during critical periods of growth and development. The program is not designed as a safety net to guard against food insecurity or hunger but rather as a targeted intervention to protect the most vulnerable members of the population—namely, pregnant women with increased nutritional needs, as well as infants and children—from the effects of these phenomena. Although income eligibility is set at 185 percent of the Federal poverty level, most participants live in households with incomes at or below the poverty line. The WIC population also includes a high proportion of ethnic minorities—subgroups found to have the highest rates of food insecurity nationally (Nord, Andrews, & Carlson, 2002). In 2001, the WIC Program served about 7.3 million participants each month (USDA, 2001) and provided cash grants totaling \$4.1 billion to 88 State agencies (USDA, 2000).

In the Institute of Medicine's (IOM) 1996 report evaluating WIC nutrition risk criteria, it was suggested for the first time that food insecurity be used as a risk criterion for program eligibility. A subsequent report (Institute of Medicine, 2002) evaluating dietary assessment in the WIC Program recognized the significance of food insecurity as a potential contributor to nutritional risk and the likely benefit from participation in the WIC Program. However, the report did not offer specific recommendations about food insecurity because of lack of sufficient evidence on which to select a cutoff point to identify those most likely to benefit.

In addition to referrals for social services, the WIC Program offers

participants a supplemental food package tailored to participants' nutritional needs. The food package for pregnant clients has a value of nearly \$70 per month and contains foods that are suitable for consumption by all family members. Items include juice, cereal, eggs, milk and cheese, and a choice of beans or peanut butter. The package for the postpartum period is similar but has smaller quantities of these items and is worth about \$60. This package may also include canned tuna and fresh carrots for women who choose to breastfeed or infant formula for women who choose not to breastfeed.

The purpose of this study was to ascertain the baseline food security status of pregnant, first-time WIC participants and to identify any changes in food security status over the course of their pregnancy. We also wanted to determine whether particular aspects of the WIC Program were associated with changes in food security status of participants over time and, if so, what those characteristics might be.

Methods

Participant Recruitment and Data Collection

Women were recruited while enrolling for services at selected centers in the Public Health Foundation Enterprises (PHFE) WIC Program catchment area in Los Angeles (CA) between March and September 1999. Eligibility criteria for participants included (1) no prior enrollment in the WIC Program, (2) 16 or fewer weeks of pregnancy, (3) self-identification as Hispanic or African-American, (4) ability to speak either English or Spanish, and (5) being at least 18 years of age. The study was restricted to Hispanic and African-American women because, based on national data, these groups have the highest prevalences of household food insecurity.

Additionally, resources did not allow inclusion of adequate numbers of other ethnic groups. A total of 558 women were asked to participate; 43.7 percent refused and 0.4 percent were deemed ineligible. The two primary reasons for refusal (accounting for 80 percent of refusals) were not having enough time and not being interested. A final sample of 313 women was recruited; 38 (12 percent) dropped out during the study. Individuals who left the study had significantly lower average household income than did those who remained (\$8,780 vs. \$11,660).

Interviews were conducted at the WIC center where women were seeking services. Specially trained WIC nutritionists conducted three interviews over the period of 1 year in conjunction with regularly scheduled WIC appointments. Interviews were conducted at enrollment into the WIC Program (first 16 weeks of pregnancy), near the end of the third trimester, and 3 to 6 months postpartum. Household food security status was assessed with the U.S. Food Security Survey Module (Hamilton et al., 1997). The initial interview assessed household food security status over the previous 12 months. Subsequent interviews covered household food security for the prior 3 months, the shortest possible interval between interviews. The following data were also collected:

- **Household demographic variables:** age, income, household composition, ethnicity, education, marital status, language preference, and country of origin (first interview);
- **Program participation:** participation in Medi-Cal (California's version of Medicaid public health care insurance), Food Stamp Program and/or Temporary Assistance for Needy Families, and use of food banks and pantries (first and third interviews);

- **Pregnancy outcomes:** parity, gestation weeks at study entry, gestational age of infant at birth, and infant-feeding practices (first and third interviews); and
- **Use of WIC food package as income transfer:** expenditures for groceries and other nonfood items and whether, and how, these had changed since entrance into the WIC Program (second interview).

The protocol for this study was approved by the UCLA institutional review board.

Data Analysis

Household food security status was assigned according to the Guidelines for Using the Core Food Security Module (Bickel et al., 2000), which has since been renamed the U.S. Food Security Survey Module. Households were classified into food security status categories as follows:

- **Food secure:** Household shows no or minimal evidence of food insecurity.
- **Food insecure without hunger:** Little or no reduction in household members' food intake is reported but adjustments to food management, including diet quality, are made.
- **Food insecure with hunger:** Food intake in the household is reduced to the extent that adults repeatedly experience hunger.
- **Food insecure with severe hunger:** Food intake is further reduced so that children experience hunger and adults report more extensive reductions in food intake.

When determining household food security status, we included child-referenced items differentially between

baseline and follow-up interviews. If the household had no children at the initial interview, household food security status was based on only 10 items; if other children were in the family, all 18 items were used. For the final interviews during the postpartum period, all 18 items were used to assess food insecurity.

Qualitative data on allocation of additional food dollars were analyzed by comparing response categories to identify linkages between them and to consolidate data into the most common themes (Bernard, 2002). Responses were then tallied and percentages computed by using the total number of responses as the denominator.

Statistical Methods

Statistical analyses were performed with SPSS for Windows (Version 11.0). Analysis of variance and chi-square analyses were used to explore relationships between household food security status and household demographics, program participation, and pregnancy outcome variables. Logistic regression was conducted to determine whether variables could be identified that would explain the process of attaining or not attaining household food security over the course of 1 year. Only participants who were food insecure at study entry and remained in the study through the postpartum period were included in this analysis (N = 110 or 40 percent of the sample).

After the first screening of bivariate statistics, variables in the model-building process included highest year of education completed, ethnicity, income at study entry, income postpartum, language preference, marital status, number of years in the United States, parity, participation in the Medi-Cal Program at study entry and postpartum, place of birth, postpartum infant-feeding method, and occurrence of miscarriage. To find the most

Overall, one-half (50 percent) of those participants who reported being food insecure at entry to the WIC Program were classified as food secure 1 year later (112 vs. 56).

parsimonious model, we tested both forward and backward stepwise methods. We used a p-value based on the likelihood ratio test of 0.15 as the criterion for variable removal and 0.10 as the criterion for variable entry (Hosmer & Lemeshow, 1989; Afili & Clark, 1995). The outcome variable—food security status—was divided into two categories: participants who were food insecure both at study entry and during the postpartum period and those who were food insecure at study entry but achieved food security by the postpartum period. The fit of the model was assessed by using both graphing techniques (ROC curve) and classification-table methods.

Results

Basic characteristics of study participants by ethnic group and for the total sample at study entry are presented in table 1. Hispanic participants, compared with African-American participants, lived in larger households, had less formal education, entered the study a bit earlier in their pregnancies, had lower BMI at study entry, and were more likely to have recently immigrated to the United States. Additionally, Hispanic participants were more likely to be married or the equivalent (data not shown). There were no differences between groups in age or household income, although the larger household sizes of Hispanic women resulted in lower per capita income for these participants. Hispanic households reported lower rates of food security than did African-American households.

Changes in Food Security Status Over Time

Table 2 shows the reported changes in food security status from study entry to the postpartum interview for the 275 participants who remained in the study. Of these, 112 households (40.7 percent) were classified as

Table 1. Characteristics of study participants, overall and by ethnic group

Indicator	Total sample	Hispanic	African American
		<i>Mean</i>	
Age (years)	25.13	25.07	25.26
BMI (kg/m ²)*	26.44	25.90	27.17
Education (years)*	10.24	9.07	12.81
Gestational stage at study entry (weeks)*	10.83	10.18	12.27
Household size*	3.11	3.32	2.66
Income/year	\$11,912	\$11,317	\$11,317
		<i>Percent</i>	
Years in the United States			
0-5	37.4	52.1	5.1
6-10	16.9	23.3	3.1
>10	45.7	24.7	91.8
Food security status			
Food secure	57.5	54.4	64.3
Food insecure			
With no hunger	33.9	38.6	23.5
With moderate hunger	8.0	7.0	10.2
With severe hunger	0.6	2.0	0

*Significant difference between Hispanic and African-American participants based on F test or chi-square test; $p \leq 0.01$.
N = 313 (total sample); 215 (Hispanic) and 98 (African American).

food insecure at study entry; 23 (8.4 percent), with moderate or severe hunger. At the postpartum evaluation, 56 of the initially food-insecure households (20.4 percent of total participants) reported still being food insecure. Overall, one-half (50 percent) of those participants who reported being food insecure at entry to the WIC Program were classified as food secure 1 year later (112 vs. 56). The prevalence of food insecurity with moderate hunger also decreased from 8 percent at study entry to 2.9 percent postpartum. The prevalence of food insecurity with severe hunger (often including child hunger) remained the same (one family) throughout the study.

Reported Changes in Allocation of Food Dollars

During third-trimester interviews, participants were asked several questions regarding changes in personal shopping practices since enrolling in the WIC Program about 6 months previously. About two-thirds (66.4 percent) reported that they spent *less* money on groceries after enrolling (data not shown). Figure 1 shows the approximate amounts saved per month as reported by these participants. Food security status was not significantly related to reported expenditures for food and other items. Thus for about one-third of participants, the WIC food package appeared to be a complete

Table 2. Food security status at study entry, at postpartum interview, and transitional status

Food security status at <i>study entry</i>		Food security status at <i>postpartum interview</i>			
		Food insecure (29.8)			
		Food secure (70.2)	With no hunger (25.5)	With moderate hunger (3.6)	With severe hunger (0.7)
		<i>Percent</i>			
Food secure	59.3	49.8	8.0	1.5	0
Food insecure	40.7				
With no hunger	32.3	17.5	13.5	1.1	0.4
With moderate hunger	8.0	2.9	4.0	1.1	0
With severe hunger	0.4	0	0	0	0.4

n = 275.

supplement to the household budget because there was no reported substitution. For the other two-thirds, a variable amount of substitution was reported; however, about one-sixth (17.7 percent) of those who reported reduced spending for groceries from the household budget estimated the substitution at more than \$60 per month, the approximate value of the average monthly WIC food package.

Participants reported purchasing a wide array of items with the money they saved through foods already provided with the WIC food package (data not shown). The most common response, given by 30 percent of participants, was buying "items for the baby," including baby clothes, food, supplies, medicines, diapers, hospital expenses, and saving the money for the baby's arrival. Even though the question asked what participants spent their money on *other than groceries*, 27.6 percent of responses were buying "other foods," primarily more fruit, vegetables, meat, chicken, fish, and yogurt. These foods might be interpreted as improving diet quality. In addition, some participants used the money to eat out. A number of participants used the money to pay bills (e.g., phone, rent, utilities, and

credit cards). Almost 13 percent of participants saved the money, some stating for "emergencies." Other responses included doctor's visits or prescriptions, school supplies and expenses, childcare, children's shoes, transportation, and sending the money to family members living in the participant's place of birth.

Predictors of Improvement in Food Security Status

A logistic regression model yielded two significant variables predicting change in food security status over time (data not shown). The odds of achieving food security for participants who had at least a high school education were 3.5 times those for participants with less than a high school education. For participants who took part in the Medi-Cal Program during their postpartum period, the odds of achieving food security were about three times greater, compared with participants who did not participate in Medi-Cal.

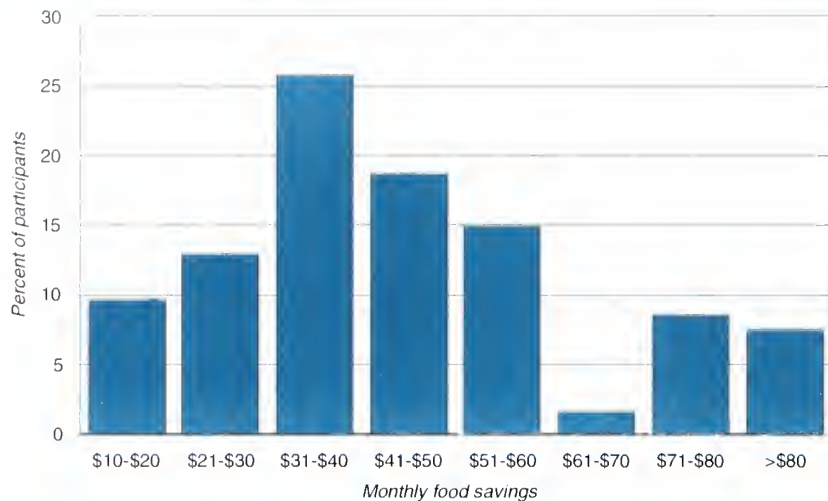
The model classified the data correctly 71.8 percent of the time. The area under the ROC curve encompassed 70.7 percent. The chi-square goodness-of-fit statistic showed that the model fit reasonably well (Pearson chi-square = .01, df = 1, p = 0.91).

We reviewed the family composition of those who reported their family food security status to be moderately food insecure and severely food insecure at all three interviews and found that all of these families had other children in addition to the newborn.

Discussion

There was considerable improvement in food security status for participants after 1 year on the WIC Program. Food insecurity decreased by half, and no participants who were initially food secure became food insecure. While we cannot completely attribute this improvement to WIC participation, our qualitative data on changes in expenditure patterns support such a conclusion. Among those who were food insecure at program entry, women whose households were most likely to move to food-secure status were either those with a high school education or more or those who had, by the postpartum period, taken advantage of Medi-Cal health insurance benefits. The strong influence of education in our findings is consistent with the literature both domestically and internationally. For example, studies demonstrating effective use of food

Figure 1. Perceived savings in groceries (per month) as a result of WIC benefits for people who spent less on food



n = 186.

assistance benefits show that women with education beyond high school are more efficient in managing their household food supply and therefore experience less food insufficiency (Basiotis, Johnson, & Morgan, 1987). Women with more years of education generally have a greater understanding of nutrition and the foods that comprise an adequate diet (Behrman & Wolfe, 1984; Behrman & Deolalikar, 1987).

Medi-Cal participation is perhaps one factor that can be directly attributed to participation in the WIC Program, because referral to health care and social services is one of the program's primary objectives. Our study demonstrated that the odds of achieving food security for participants who, by the postpartum period, took part in the Medi-Cal Program were almost three times greater than for participants who did not participate in Medi-Cal. It appears that participants who were more likely to take advantage of this health insurance program were also better able to manage their household resources to improve food security with the assistance of the WIC and Medi-Cal Programs.

All of the improvements in food security status observed in this study were among participants classified as food insecure without hunger or with moderate hunger. The prevalence of food insecurity with severe hunger was low but was unchanged across the time of the study. We speculate that food security with severe hunger indicates a level of resource constraint or household management deficit or both that is too great to be remediated effectively by the assistance that the WIC Program can provide. By conceptualizing food insecurity as a continuum with adverse effects more likely occurring at severe levels, we believe it appears that the WIC Program does enable, at least for many participants, improvements in food security at a time when vulnerability to the potential ill effects is greatest.

Our qualitative data on this relatively small sample shed some light on the question of the extent to which the WIC food package is actually providing supplemental food to the participants versus displacing monetary resources for other uses. It has been

suggested that the foods supplied by WIC may free household resources for other uses rather than truly supplementing them (Basiotis et al., 1998; Arcia, Crouch, & Kulka, 1990; Besharov & Germanis, 2001). Participants in our study commented that they used the additional money "for food, for the time her husband did not have any income" or that "the money [saved] substituted for what she couldn't buy before, [such as] bread, peanut butter, [or] more food."

While food insecurity is a self-reported (and unverifiable) attribute, it is our experience that reporting food insecurity is not easy for most people, and we do not anticipate that self-reports would be biased in the direction of overreporting. While the present study is not definitive, it demonstrates that rates of household food insecurity among a group of first-time WIC participants were significantly reduced after participation in the WIC Program for several months. Because food insecurity is a nutrition and health concern in its own right, identifying individuals who are food insecure may also be a more specific way of targeting individuals who are nutritionally vulnerable rather than assuming that nearly all low-income women in their childbearing years and children ages 2 to 5 years are at dietary risk.

Historically, WIC Program services that have been targeted to the most vulnerable have achieved the greatest success in improving the health and wellness of their clients (Abrams, 1993; Devaney, Bilheimer, & Schore, 1992; GAO, 1992; Rush et al., 1988). To continue to improve on this history of success, efforts should be concentrated on choosing appropriate criteria that will help the most needy (Besharov & Germanis, 2001).

This study has several limitations. The sample was limited and not

representative at the local, State, or national levels. Asian Americans and Caucasians were not included, and there was a larger-than-expected proportion of recently immigrated Hispanic participants. Similar to all research on the effect of the WIC Program, our study was constrained by lack of a control group. WIC participants self-select into the program. In Los Angeles County, an overwhelming proportion of low-income pregnant women participate in the WIC Program, which makes it effectively impossible to find a comparable control group. We considered a comparison group of first-time pregnant women who entered the WIC Program late in their pregnancy, but such participants are significantly fewer and likely to be systematically different from those who enter the program in their first trimester. Although this limitation is real, an effort to deal with this bias in this study was made by implementing a prospective, longitudinal design and by using a combination of quantitative and qualitative data.

effect of the WIC Program on the food security status of pregnant clients.

The recent IOM Report on Dietary Assessment in the WIC Program concluded that insufficient evidence existed to set a cutoff point for determination of what level of food insecurity would identify participants most likely to benefit from program participation. The results of the present study indicate that any level of food insecurity, as identified by the currently available instrument, is indicative of a potential to benefit. Indeed, there was less effect on the prevalence of food insecurity with severe hunger than on food insecurity without hunger or with moderate hunger, although the numbers were too small to conclude much about the dynamics. We speculate that for households on the margin of monetary and management resources, WIC may provide the boost at a critical time to move into a more secure situation, while food insecurity with severe hunger may indicate a level of constraint too severe to be addressed effectively by this program alone.

Conclusions

A 50-percent reduction in the rate of food insecurity was observed for this group of pregnant, first-time WIC participants who were in the program for 1 year. For participants whose food security status improved, it appears that the core components of the WIC Program had at least some beneficial effect. More educated participants and those who enrolled in public health insurance were more likely than others to experience improved food security status over time; other demographic variables, including ethnicity, household income, and immigration status, were not strongly related. While these results are not conclusive, they do provide some evidence for the positive

Acknowledgments

This study was supported in part by the California Cancer Research Program, California Department of Health Services, contract # 99-00526V-10128. We thank the staff at the WIC centers whose time and dedication made this study possible.

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Expenditures on Children by Families, 2003

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This article presents the 2003 estimates of expenditures on children by husband-wife and single-parent families. Data and methods used in calculating annual child-rearing expenses are described. Estimates are provided by budgetary component, age of the child, family income, and region of residence. For the overall United States, estimates of child-rearing expenses ranged between \$9,510 and \$10,560 for a child in a two-child, husband-wife family in the middle-income group.

Child rearing is a costly endeavor. Since 1960, the U.S. Department of Agriculture (USDA) has provided annual estimates of family expenditures on children from their birth through age 17. USDA's annual child-rearing expense estimates are used in four major ways:

- **To determine State child support guidelines.** The economic well-being of millions of children is affected by child support. Under the Family Support Act of 1988, States are required to have numeric child support guidelines and to consider the economic costs of raising a child when establishing these guidelines.
- **To determine State foster care payments.** Many States use the estimates to determine how much to reimburse people with foster children. In 2001, about 542,000 children were in foster care (U.S. Department of Health and Human Services, 2003).
- **To appraise damages arising from personal injury or wrongful death cases.** For example, if a person with children is hurt on a job such that he or she cannot work, the courts use the child-rearing expense figures to determine compensation for the family.

- **To educate anyone who is considering when or whether to have children.** Knowing how much it costs to raise a child until that child reaches the age of maturity may encourage teens to wait until adulthood and be more prepared financially to have children.

USDA Method for Estimating Expenditures on Children by Families¹

USDA provides annual estimates of expenditures on children from their birth through age 17. These expenditures on children, by husband-wife and single-parent families, are estimated for the major budgetary components: housing, food, transportation, clothing, health care, child care/education, and miscellaneous goods and services (see box).

¹*Expenditures on Children by Families, 2003* provides a more detailed description of the data and methods. To obtain a copy, go to <http://www.cnpp.usda.gov> or contact USDA, Center for Nutrition Policy and Promotion, 3101 Park Center Drive, Room 1034, Alexandria, VA 22302 (voice: 703-305-7600).

The most recently calculated child-rearing expenses are based on 1990-92 Consumer Expenditure Survey (CE) data, which are updated to 2003 dollars by using the Consumer Price Index (CPI). The CE, administered by the Bureau of Labor Statistics, U.S. Department of Labor, is the only Federal survey of household expenditures collected nationwide. It contains information on sociodemographic characteristics, income, and expenditures of a nationally representative sample of households. The sample used to determine child-rearing expenses consisted of 12,850 husband-wife and 3,395 single-parent households, weighted to reflect the U.S. population of interest.

In determining child-rearing expenses, USDA examines the intrahousehold distribution of expenditures by using data for each budgetary component.

In the CE, the data on these budgetary components are child specific (clothing, child care, and education) and household specific (housing, food, transportation, health care, and miscellaneous goods and services). Multivariate analysis, used to estimate household- and child-specific expenditures, controlled for income level, family size, age of the child, and region of residence (when appropriate) so that expenses could be determined for families with these varying characteristics.

Estimates of child-rearing expenses are provided for three income levels, which were determined by dividing the sample of husband-wife families in the overall United States into equal thirds. For each income level, the estimates are for the younger child in families with two children. These younger children were grouped in one of six age categories: 0-2, 3-5, 6-8, 9-11,

12-14, or 15-17. Households with two children were selected as the standard because this was the average household size in 1990-92. The focus is on the younger child because the older child may be over age 17.

Child-rearing estimates provided by the USDA are based on CE interviews of households with and without specific expenses. For some families, expenditures may be higher or lower than the mean estimates, depending on whether or not they incur a particular expense. Calculation of child care and education expenditures are examples, because about 50 percent of husband-wife families in the study spent no money on these goods and services. Also, the estimates cover only out-of-pocket expenditures on children made by the parents and not by others, such as grandparents or friends.

Categories of Household Expenditures

Housing expenses: shelter (mortgage interest, property taxes, or rent; maintenance and repairs; and insurance), utilities (gas, electricity, fuel, telephone, and water), and house furnishings and equipment (furniture, floor coverings, and major and small appliances). For homeowners, housing expenses do not include mortgage principal payments; in the data set used, such payments are considered to be part of savings.

Food expenses: food and nonalcoholic beverages purchased at grocery, convenience, and specialty stores, including purchases with food stamps; dining at restaurants; and household expenditures on school meals.

Transportation expenses: the net outlay on the purchase of new and used vehicles, vehicle finance charges, gasoline and motor oil, maintenance and repairs, insurance, and public transportation.

Clothing expenses: children's apparel such as diapers, shirts, pants, dresses, and suits; footwear; and clothing services such as dry cleaning, alterations and repair, and storage.

Health care expenses: medical and dental services not covered by insurance, prescription drugs and medical supplies not covered by insurance, and health insurance premiums not paid by the employer or other organizations.

Child care and education expenses: daycare tuition and supplies; babysitting; and elementary and high school tuition, books, and supplies.

Miscellaneous expenses: personal care items, entertainment, and reading materials.

After estimating the various overall household and child-specific expenditures, USDA allocated these total amounts among family members (i.e., in a married-couple, two-child family, the total amounts were allocated to the husband, wife, older child, and younger child). Because the expenditures for clothing, child care, and education are child specific—and apply only to children—allocations of these expenses were made by dividing them equally among the children. The CE does not collect child-specific expenditures on food and health care. Thus, to apportion these budgetary components to a child based on his or her age, USDA used data from other Federal studies, which show the shares of the household budget spent on children's food and health care.

Unlike what is the case for food and health care, no authoritative source exists for allocating among family members the amount the household spends on housing, transportation, and other miscellaneous goods and services. The marginal cost and the per capita methods are, however, two common approaches used to allocate these expenses.

The marginal cost method measures expenditures on children as the difference in expenses between couples with children and equivalent childless couples. Various equivalency measures, yielding very different estimates of expenditures on children, have been proposed, but no standard measure has been accepted by economists. Also, the marginal cost approach assumes that the difference in total expenditures between couples with and without children can be attributed solely to the presence of children in a family. This assumption is questionable, especially because couples without children often buy homes larger than they need in anticipation of having children. Comparing the expenditures

of these couples with those of similar couples with children could lead to underestimating how much is spent on meeting the lifetime needs—and wants—of children.

For these reasons, USDA uses the per capita method to allocate expenses on housing, transportation, and miscellaneous goods and services in equal proportions among household members. Although the per capita method has its limitations, they are considered less severe than those of the marginal cost approach.

Because transportation expenses resulting from work activities are not related directly to the cost of raising a child, these expenses were excluded when determining children's transportation expenses.

Expenditures on Children by Husband-Wife Families

Child-Rearing Expenses and Household Income Are Positively Associated

In 2003, estimated average expenses on children increased as income level rose (fig. 1). Depending on the age of the child, the annual expenses ranged from \$6,820 to \$7,840 for families in the lowest income group, from \$9,510 to \$10,560 for families in the middle-income group, and from \$14,140 to \$15,350 for families in the highest income group. The before-tax income in 2003 for the lowest income group was less than \$40,700, between \$40,700 and \$68,400 for the middle-income group, and more than \$68,400 for the highest income group.

On average, households in the lowest income group spent 28 percent of their before-tax income per year on a child; those in the middle-income group, 18 percent; and those in the highest

On average, households in the lowest income group spent 28 percent of their before-tax income per year on a child; those in the middle-income group, 18 percent; and those in the highest group, 14 percent.

group, 14 percent. The range in these percentages would be narrower if after-tax income were considered, because a greater percentage of income in higher income households goes toward taxes.

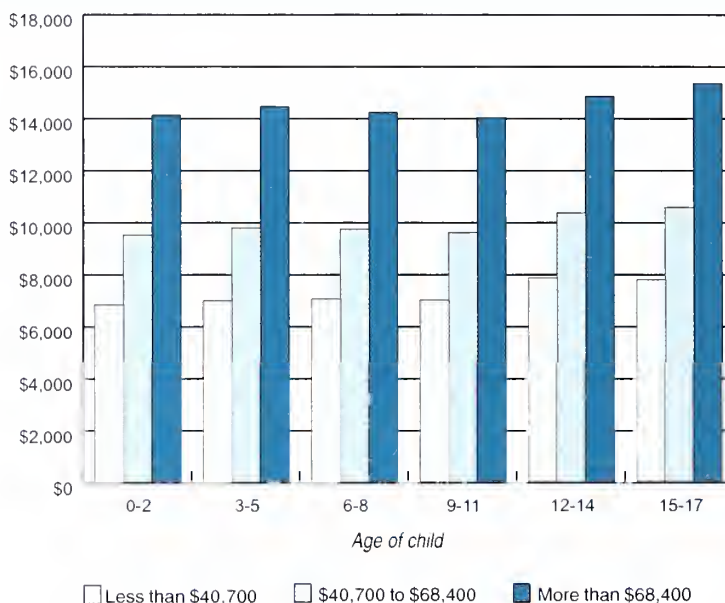
On average, the amount spent on children by families in the highest income group was about twice the amount spent by families in the lowest income group. This amount varied by budgetary component. In general, expenses on a child for goods and services considered to be necessities (e.g., food and clothing) did not vary as much as those considered to be discretionary (e.g., miscellaneous expenses) among households in the three income groups.

Housing Is the Largest Expense on a Child

Housing accounted for the largest share of total child-rearing expenses. (Figure 2 demonstrates this for middle-income families.) Based on expenses incurred among all age groups, housing accounted for 32 percent of child-rearing expenses for a child in the lowest income group, 34 percent in the middle-income group, and 37 percent in the highest income group. Food, the second largest average expense on a child for families—regardless of income level—accounted for 20 percent of child-rearing expenses in the lowest income group, 17 percent in the middle-income group, and 15 percent in the highest income group. Transportation was the third largest child-rearing expense across income levels, averaging 13 to 14 percent.

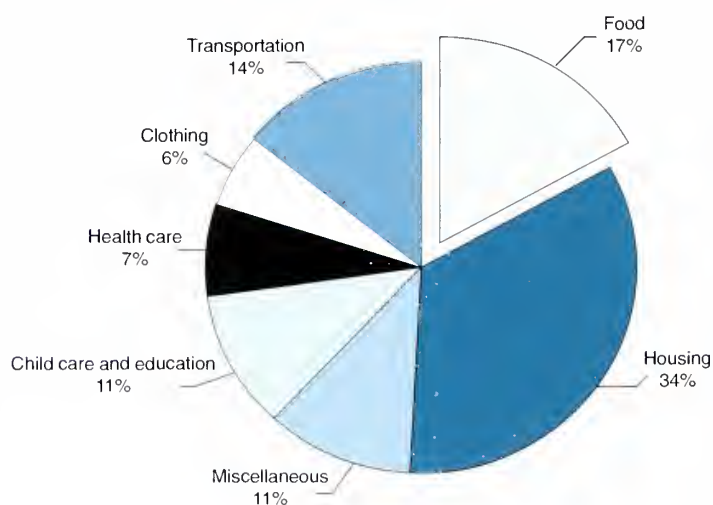
Across the three income groups, miscellaneous goods and services (personal care items, entertainment, and reading materials) was generally the fourth largest expense on a child for families, 10 to 12 percent. Clothing (excluding gifts or hand-me-downs) accounted for 5 to 7 percent of expenses on a child for families; child

Figure 1. Family expenditures on a child, by income level and age of child,¹ 2003



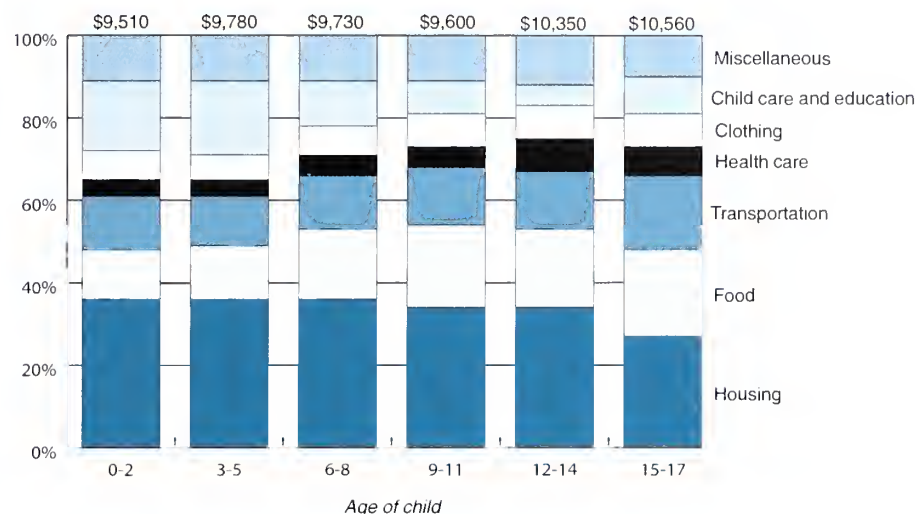
¹U.S. average for the younger child in husband-wife families with two children.

Figure 2. Expenditure shares on a child from birth through age 17 as a percentage of total child-rearing expenditures,¹ 2003



¹U.S. average for the younger child in middle-income, husband-wife families with two children.

Figure 3. Total expenses and expenditure shares on a child (as a percentage of total child-rearing expenditures), by age of child,¹ 2003



¹U.S. average for the younger child in middle-income, husband-wife families with two children.

care and education, 9 to 12 percent; and health care, 6 to 8 percent. Estimated expenditures for health care consisted of out-of-pocket expenses only (including insurance premiums not paid by an employer or other organizations) and not that portion covered by health insurance.

Expenses Increase as a Child Gets Older

Expenditures on a child were generally lower in the younger age categories and higher in the older age categories. (Figure 3 depicts this for families in the middle-income group.) This relationship held across income groups even though housing expenses, the highest child-rearing expenditure, generally declined as a child grew older. The decline in housing expenses reflects diminishing interest paid by homeowners over the life of a mortgage. Payments on principal are not considered part of housing costs in the CE; they are deemed to be a part of savings.

For all three income groups, food, transportation, clothing, and health

care expenses related to child-rearing generally increased as the child grew older. Transportation expenses were highest for a child age 15-17, when he or she would start driving. Child care and education expenses were highest for a child under age 6. Most of this expense may be attributed to child care at this age. The estimated expense for child care and education may seem low for those with the expenses, because these estimates reflect the average by households with *and* without the expense.

Child-Rearing Expenses Are Highest in the Urban West

Child-rearing expenses in the regions of the country reflect patterns observed in the overall United States; in each region, expenses on a child increased with household income level and, generally, with the age of the child. (Figure 4 shows total child-rearing expenses by region and age of a child for middle-income families.) Overall, child-rearing expenses were highest in the urban West, followed by the urban Northeast and urban South. Child-

rearing expenses were lowest in the urban Midwest and rural areas. Much of the regional difference in expenses on a child was related to housing costs. Total housing expenses on a child were highest in the urban West and urban Northeast and lowest in rural areas. However, child-rearing transportation expenses were highest for families in rural areas. This likely reflects the longer traveling distances and the lack of public transportation in these areas.

Older Children and the “Cheaper-by-the-Dozen” Effect

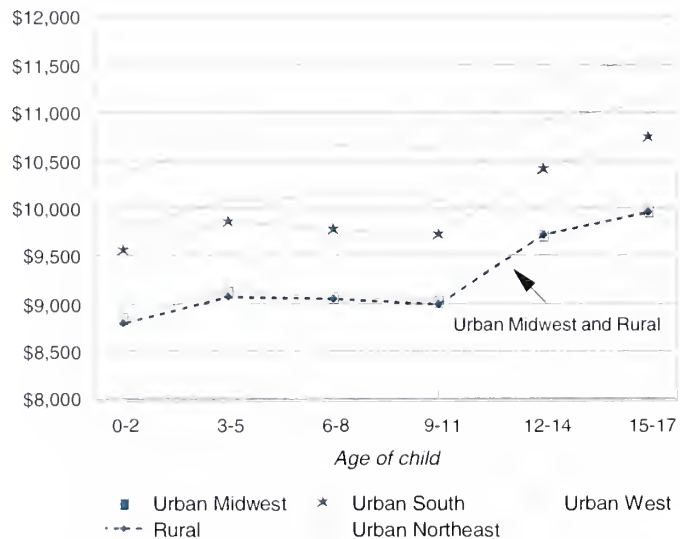
The expense estimates on a child represent expenditures on the younger child, at various ages, who is one of two children in a husband-wife household. We cannot assume that expenses on the older child are the same at these various ages. The method for estimating expenses on the younger child was essentially repeated to determine whether expenses vary by birth order. The focus was on the older child in each of the same age categories as those used with the younger child. A two-child family was again used as the standard.

On average, for husband-wife households with two children, expenditures did not vary by birth order. Thus, annual expenditures on children in a husband-wife, two-child family may be estimated by summing the expenses for the appropriate age categories (fig. 1).

Although expenses on children did not vary by birth order, they did differ when a household had only one child or more than two children. Depending on the number of other children in the household, families spent more or less on a child—achieving a “cheaper-by-the-dozen” effect as they had more children.

The method to estimate child-rearing expenses was repeated for families

Figure 4. Family expenditures on a child, by region and age of child,¹ 2003



¹Regional averages for the younger child in middle-income, husband-wife families with two children.

with one child and families with three or more children. Compared with expenditures for each child in a husband-wife family with two children, expenditures in a husband-wife household with one child averaged 24 percent more on the single child; expenditures for those with three or more children averaged 23 percent less on each child. Hence, family income is spread over fewer or more children, subject to economies of scale. As families have more children, the children can share a bedroom, clothing and toys can be handed down to younger children, and food can be purchased in larger and more economical packages.

Expenditures on Children by Single-Parent Families

The estimates of expenditures on children by husband-wife families do not apply to single-parent families, a group that accounts for an increasing percentage of families with children. Therefore, for the overall United

States, USDA calculated separate estimates of child-rearing expenses in single-parent households. CE data were used to do so. Most single-parent families in the survey were headed by a woman (90 percent). The method previously described was followed; however, regional estimates were not calculated for single-parent families because of limitations in the sample size.

Estimates cover only out-of-pocket child-rearing expenditures made by the single parent with primary care of the child and do not include child-related expenditures made by the parent without primary care or expenditures made by others, such as grandparents. The data did not contain this information. Overall expenses by both parents on a child in a single-parent household are likely greater than the USDA's estimates of child-rearing expenses.

Table 1 presents estimated expenditures on the younger child in a single-parent family with two children, compared with those of the younger child in a

Table 1. Family expenditures on a child, by lower income single-parent and husband-wife households,¹ 2003

Age of child	Single-parent households	Husband-wife households
0 - 2	\$5,700	\$6,820
3 - 5	6,440	6,970
6 - 8	7,230	7,040
9 - 11	6,710	6,990
12 - 14	7,210	7,840
15 - 17	7,960	7,770
Total (0 - 17)	\$123,750	\$130,290

¹Estimates are for the younger child in two-child families in the overall United States.

husband-wife family with two children. Each family type was in the lower income group, having before-tax income less than \$40,700. About 83 percent of single-parent families and 33 percent of husband-wife families were in this lower income group. More single-parent than husband-wife families, however, were in the bottom range of this income group and had an average income of \$17,000, compared with \$25,400 for husband-wife families. Although average income varied for these lower income families, total expenditures on a child through age 17 were, on average, only 5 percent lower in single-parent households than in two-parent households.

Single-parent families in this lower income group, therefore, spent a larger proportion of their income on children than did their counterpart two-parent families. On average, housing expenses were higher for single-parent families than for two-parent families; whereas, transportation, health care, child care and education, and miscellaneous expenditures on a child were lower in single-parent than in husband-wife households. Child-related food and clothing expenditures were similar, on average, for both family types.

For the higher income group of single-parent families with 2003 before-tax income of \$40,700 and over,² estimates of child-rearing expenses were about the same as those for two-parent households in the before-tax income group of \$68,400 and over. In 2003 dollars, total expenses for the younger child through age 17 were \$261,750 for single-parent families versus \$261,270 for husband-wife families. Child-rearing expenses for the higher income group of single-parent families, therefore, were also a larger proportion of income than was the case for husband-wife families. Thus, expenditures on children do not differ much between single-parent and husband-wife households; what differs is household income level. Because single-parent families have one less potential earner than do husband-wife families, on average, their total household income is lower and child-rearing expenses as a percentage of income are greater.

The same procedure was used to estimate child-rearing expenses on an older child in single-parent households as well as by household size.

²The two higher income groups were combined for single-parent families.

On average, single-parent households with two children spent 7 percent less on the older child than on the younger child (regardless of age-related differences). This contrasts with husband-wife households whose expenditures on children were unaffected by the children's birth order.

As with husband-wife households, single-parent households spent more or less if there was either one child or three or more children. Compared with expenditures for the younger child in a single-parent household with two children, expenditures for an only child in a single-parent household averaged 35 percent more; single-parent households with three or more children averaged 28 percent less on each child.

Other Expenditures on Children

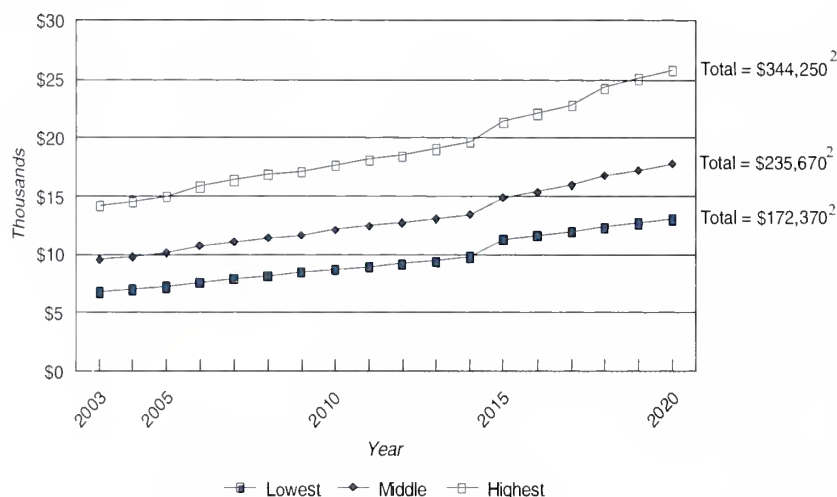
The USDA child-rearing expense estimates consist of direct expenses made by parents on children through age 17 for seven major budgetary components. The expenses exclude costs related to childbirth and prenatal health care and other expenditures, especially those incurred after a child turns age 18.

One of the largest expenses made on children after age 17 is that of a college education. The College Board estimated that in 2003-2004, annual average tuition and fees were \$4,454 at 4-year public colleges and \$17,040 at 4-year private colleges; annual room and board was \$5,475 at 4-year public colleges and \$6,403 at 4-year private colleges (The College Board, 2003). Other parental expenses on children after age 17 could include those associated with children living at home or, if children do not live at home, gifts and other contributions to them. A study by Schoeni and Ross

Child-Rearing Expenses Over Time

The estimates presented in this article represent household expenditures on a child of a certain age in 2003. Future price changes need to be incorporated to estimate these expenses over time. Thus, a future cost formula was used, and the results are presented in this graph. The estimated future expenditures are on the younger child in a husband-wife family with two children. The assumptions are that a child is born in 2003 and reaches age 17 in 2020 and that the average annual inflation rate over this time is 3.1 percent (the average annual inflation rate over the past 20 years). The result: total family expenses on a child through age 17 would be \$172,370 for households in the lowest income group, \$235,670 for those in the middle, and \$344,250 for those in the highest income group.

Estimated annual expenditures on a child born in 2003, by income group, overall United States¹



¹Estimates are for the younger child in husband-wife families with two children.

²Total reflects expenses on a child through age 17.

(2003) found that parents contribute, on average, \$2,200 annually (in 2001 dollars) to children ages 18 to 34.

USDA's estimates do not include all governmental expenditures on children, such as public education, Medicaid, and subsidized school meals. Actual expenditures on children (by parents and the government), therefore, would be higher than reported here. The indirect costs of raising children—time allocated to child rearing and decreased earnings—are not included in the estimates. Although these costs are more difficult to measure than direct expenditures, they can be as high, if not higher than, the direct costs of raising children (Spalter-Roth & Hartmann, 1990; Bryant, Zick, & Kim, 1992; Ireland & Ward, 1995).

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The Healthy Eating Index, 1999-2000: Charting Dietary Patterns of Americans

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To assess and monitor the dietary status of Americans, the U.S. Department of Agriculture's Center for Nutrition Policy and Promotion developed the Healthy Eating Index (HEI). The HEI consists of 10 components, each representing a different aspect of a healthful diet. This article presents the most recent HEI for people 2 years old and over and subgroups of the population. Data from the 1999-2000 National Health and Nutrition Examination Survey are used. Ten percent of the population had a good diet, 16 percent had a poor diet, and the remainder had a diet that needs improvement. Americans need especially to improve their consumption of fruit and milk products. Males age 15 to 18, non-Hispanic Blacks, low-income groups, and those with a high school diploma or less education had lower quality diets. The diets of Americans have not changed since 1996, but they have improved since 1989.

Healthful eating is essential for human development and well-being. In the United States today, some dietary patterns are associated with 4 of the 10 leading causes of death (coronary heart disease, certain types of cancer, stroke, and type 2 diabetes) (U.S. Department of Health and Human Services [DHHS], 2000). A healthful diet, however, can reduce major risk factors for chronic diseases such as obesity, high blood pressure, and high blood cholesterol (USDA & DHHS, 2000). Studies have shown an increase in mortality associated with overweight¹ and obesity resulting from poor eating habits (DHHS, 2001). Thus, major improvements in the health of the American public can be made by improving people's dietary patterns.

To assess Americans' dietary status and to monitor changes in these patterns, the U.S. Department of Agriculture's

(USDA) Center for Nutrition Policy and Promotion (CNPP) developed the Healthy Eating Index (HEI). (Kennedy, Ohls, Carlson, & Fleming, 1995). Relatively new, the HEI had been computed twice, with 1989-90 and with 1994-96 data (USDA, 1995; Bowman, Lino, Gerrior, & Basiotis, 1998), and is a summary measure of the overall quality of people's diets (broadly defined in terms of adequacy, moderation, and variety).

This article presents the HEI for 1999-2000 (Basiotis, Carlson, Gerrior, Juan, & Lino, 2002), which for the first time uses data from the National Health and Nutrition Examination Survey (see box); 1999-2000 is the most recent period for which nationally representative data are available to compute the HEI. The 1999-2000 HEI is calculated for the general population and selected subgroups and is compared with the HEI of earlier years to examine possible trends in the diets of Americans.

¹The Healthy Eating Index measures overall diet quality but does not necessarily reflect overconsumption.

Data Used to Calculate the Healthy Eating Index

The Federal Government's National Health and Nutrition Examination Survey (NHANES) provides information on people's consumption of foods and nutrients, as well as extensive health-related data and information about Americans' demographic and socioeconomic characteristics. NHANES data for 1999-2000—the most recent data available—were used to compute the HEI. Previous HEI estimates were based on data from the Federal Government's Continuing Survey of Food Intakes by Individuals (CSFII) (USDA, 1998).

For the 1999-2000 NHANES, individuals' dietary intakes were collected for 1 day. Prior research has indicated that food intake data based on a 1-day dietary recall are reliable measures of usual intakes by population groups (Basiotis, Welsh, Cronin, Kelsay, & Mertz, 1987). Data were primarily collected through an in-person interview by using the 24-hour dietary recall method. Typically, for children under 6 years old, information was provided by the parent (if the parent was not available, a proxy provided the information); the parent or proxy could also consult with others, such as a day care provider, regarding what the child ate. For children 6 to 11 years old, information was provided by the child, with assistance typically from the parent (again, if the parent was not available, a proxy provided the information). Information about dietary intake for individuals 12 years and older was self-reported.

NHANES 1999-2000 is a complex, multistage probability sample of the U.S. civilian noninstitutionalized population. Individuals of all ages were sampled. The NHANES 1999-2000 sample includes expanded samples of Mexican Americans, African Americans, adolescents 12 to 19 years old, and adults 60 years and older. In 2000, the sample individual selection probabilities were modified to increase the number of sampled persons in low-income, non-Hispanic White population domains. Additionally, screening and sampling rates were adjusted for women of childbearing age to increase the number of pregnant women included in the sample. Statistical weights were used to make the sample representative of the U.S. population.

The HEI was computed for all individuals 2 years and older, because dietary guidelines are applicable to people of these ages only. Pregnant women were excluded from this analysis because of their special dietary needs. The final analytical sample size was 8,070 people.

Components and Scoring of the Healthy Eating Index

The HEI, representing various aspects of a healthful diet, provides an overall picture of the type and quantity of foods that people eat, their compliance with specific dietary recommendations, and the variety in their diets. The total HEI score is the sum of 10 dietary components:

- Components 1-5 measure the degree to which a person's diet conforms to serving recommendations for the five major food groups of the Food Guide Pyramid: grains (bread, cereal, rice, and pasta), vegetables, fruits, milk (milk, yogurt, and cheese), and meat (meat, poultry, fish, dry beans, eggs, and nuts).
- Component 6 measures total fat consumption as a percentage of total food energy (calorie) intake.
- Component 7 measures saturated fat consumption as a percentage of total food energy intake.
- Component 8 measures total cholesterol intake.
- Component 9 measures total sodium intake.
- Component 10 examines variety in a person's diet.

With each component of the HEI having a maximum score of 10 and a minimum score of 0, the highest possible overall HEI score is 100. Recommendations of the *Dietary Guidelines for Americans* (USDA, 2000), the Food Guide Pyramid (USDA, 1996; Dietary Guidelines Advisory Committee, 2000), the Committee on Diet and Health of the National Research Council (National

Table 1. Components of the Healthy Eating Index and scoring system

	Score ranges ¹	Criteria for maximum score of 10	Criteria for minimum score of 0
Grain consumption	0 to 10	6 - 11 servings ²	0 servings
Vegetable consumption	0 to 10	3 - 5 servings ²	0 servings
Fruit consumption	0 to 10	2 - 4 servings ²	0 servings
Milk consumption	0 to 10	2 - 3 servings ²	0 servings
Meat consumption	0 to 10	2 - 3 servings ²	0 servings
Total fat intake	0 to 10	30% or less energy from fat	45% or more energy from fat
Saturated fat intake	0 to 10	Less than 10% energy from saturated fat	15% or more energy from saturated fat
Cholesterol intake	0 to 10	300 mg or less	450 mg or more
Sodium intake	0 to 10	2400 mg or less	4800 mg or more
Variety	0 to 10	8 or more different items in a day	3 or fewer different items in a day

¹People with consumption or intakes between the maximum and minimum ranges or amounts were assigned scores proportionately.

²Number of servings depends on Recommended Energy Allowance. All amounts are on a per-day basis.

Research Council, 1989a, 1989b), as well as consultations with nutrition researchers, were the bases used by CNPP to score intake levels. (See table 1 for details on the scoring system.) CNPP assigned a score of 10 when food consumption met the Food Guide Pyramid recommendations; when fat (total and saturated), cholesterol, and sodium intake met the recommendations; or when a person consumed at least half a serving each of 8 or more different foods in a day (variety). A score of 0 was assigned when a person did not consume any item from a Pyramid food group; when intake was greater than the recommendations for fat, cholesterol, and sodium; or when a person consumed at least half a serving of 3 or fewer different foods in a day. All other consumption and intake levels were scored proportionately. With this scoring system, the higher the component scores, the closer consumption or intakes are to the recommended ranges or amounts.

An HEI score over 80 implies that a person has a good diet; a score between 51 and 80, a diet that needs improvement; and a score less than 51, a poor diet.² (For more details on how the HEI is computed, see *The Healthy Eating Index: 1999-2000* at www.cnpp.usda.gov.)

Healthy Eating Index Overall and Component Scores

During 1999-2000, the mean HEI score for the U.S. population was 63.8; that is, the score indicates that the American diet needs improvement. Ninety percent of Americans had a diet that was poor or needed improvement. Only 10 percent of Americans had a good diet—

²This scoring system was developed in the initial HEI work by Kennedy et al. (1995) in consultation with nutrition experts.

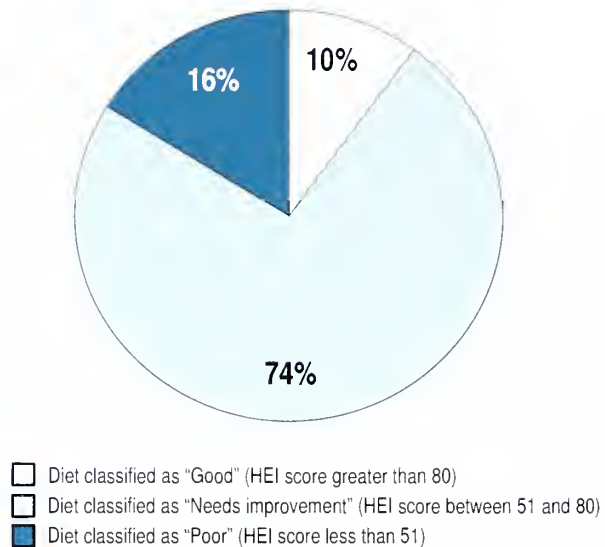
one that mostly met recommendations of the *Dietary Guidelines for Americans*, the Food Guide Pyramid, and other recommendations for healthful eating.

During 1999-2000, the highest mean HEI component scores for the U.S. population were for cholesterol and variety, both averaging 7.7 on a scale of 10 (fig. 2a). With an average score of 6.9, total fat accounted for the next highest component score. People had the two lowest mean scores for the fruits and milk components of the HEI, averaging 3.8 and 5.9, respectively. Average scores for the other HEI components were between 6 and 6.7.

Overall, 69 percent of the U.S. population had a maximum score of 10 for cholesterol—that is, they met the dietary recommendation. Fifty-five percent had a maximum score for variety during 1999-2000 (fig. 2b).

Figure 1. Healthy Eating Index rating, U.S. population, 1999-2000

During 1999-2000, the mean HEI score for the U.S. population was 63.8; that is, the score indicates that the American diet needs improvement.



Less than 50 percent of the population met the dietary recommendations for the other 8 HEI components. Seventeen percent of people consumed the recommended number of servings of fruits per day; 24 to 30 percent met the dietary recommendations for the grains, vegetables, milk, and meat components of the HEI; and 32 to 41 percent met the dietary recommendations for total fat, saturated fat, and sodium. In general, most people could improve all aspects of their diets.

Healthy Eating Index Scores by Characteristics

HEI scores varied significantly by Americans' demographic and socioeconomic characteristics (table 2).³

³The demographic and socioeconomic characteristics of people used in this article are different from those used in previous HEI reports. Because the NHANES collected this information in a manner that differs from the CSFII method of collection, the CSFII was used to estimate the previous HEI scores.

(All differences discussed in this section are statistically significant at the 0.05 level.) Females had slightly higher overall scores than did males (64.5 vs. 63.2). Children age 2 to 3 had the highest mean HEI score (75.7) among all children, as well as among all other age/gender groups, and older children had lower HEI scores than did younger children. Children age 2 to 3, compared with older children, also scored significantly higher on several components of the HEI: fruits, vegetables, and sodium. For example, children age 2 to 3 had a mean score of 7.3 for fruits; males age 11 to 14 had a mean score of 2.7. This youngest age group also had a mean score of 6.5 for vegetables, compared with 5.0 for children age 7 to 10. Overall, most age/gender groups had HEI scores in the 61- to 67-point range, and older adults, age 51 and over, had higher HEI scores (65.1 to 66.6) than did other adults (61.3 to 63.2).

Differences in HEI scores by race/ethnicity were apparent. Mexican Americans, for example, had the highest mean HEI score—64.5 for

1999-2000. They had significantly higher average scores on the fruits and sodium components of the HEI than was the case for other racial/ethnic groups. While non-Hispanic Whites and other Hispanics had slightly lower overall HEI scores than did Mexican Americans, non-Hispanic Whites had a higher mean overall HEI score than did non-Hispanic Blacks for 1999-2000 (64.2 vs. 61.1). Compared with Whites, Blacks scored significantly lower on the milk and vegetables components of the HEI: an average of 4.5 on the milk and 5.2 on the vegetables components, compared with 6.4 and 6.2 on these two components, respectively, for non-Hispanic Whites. Native-born Americans had a lower quality diet than did members of the U.S. population born in Mexico (63.5 vs. 66).

HEI scores generally increased with levels of education and income. Among adults (age 25 and over) during 1999-2000, those with more than a high school diploma had a higher mean HEI score, compared with those without a high school diploma (65.3 vs. 61.1).

People with household income over 184 percent of the poverty threshold had a higher mean HEI score than did people with household income below the poverty threshold (65 vs. 61.7).⁴ People in higher income households had better scores on the grains, vegetables, fruits, milk, meat, and variety components of the HEI than did people in lower income households. People with household income over 184 percent of the poverty threshold had an average variety score of 8.2, while people with household income below the poverty threshold had an average variety score of 7.

Figure 2a. Healthy Eating Index: Component mean scores, 1999-2000

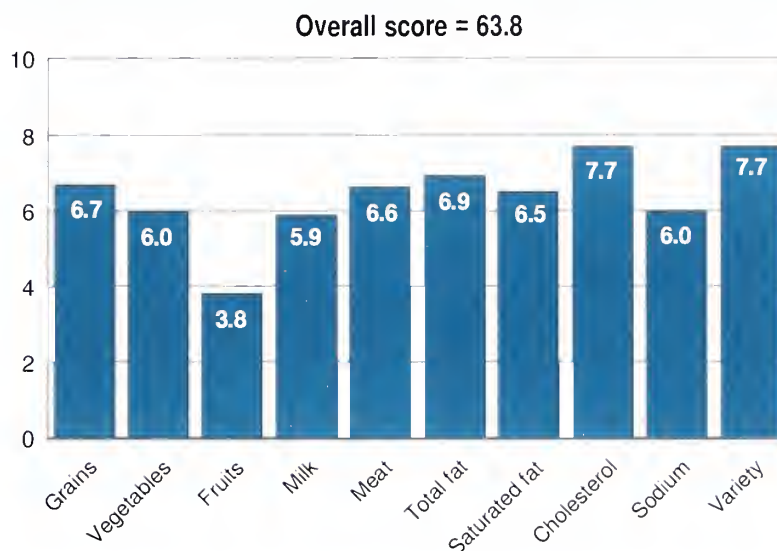
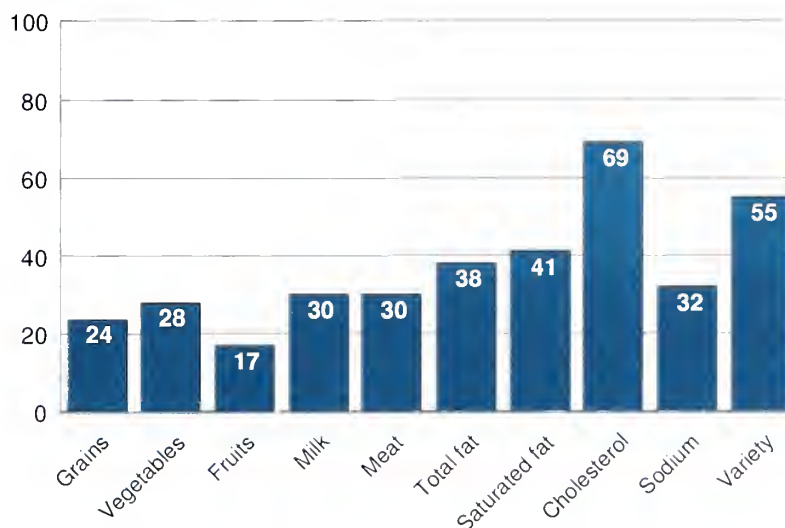


Figure 2b. Percent of people meeting the dietary recommendations for the Healthy Eating Index components, 1999-2000



⁴In 2000, the poverty threshold was \$11,531 for a family of two, \$13,861 for a family of three, \$17,463 for a family of four, and \$20,550 for a family of five.

Table 2. Healthy Eating Index, overall and component mean scores, by selected characteristics, 1999-2000

Characteristic	Overall	Grains	Vegetables	Fruits	Milk	Meat ¹	Total fat	Saturated fat	Cholesterol	Sodium	Variety
Gender											
Male	63.2	6.9	5.9	3.5	6.3	7.2	6.9	6.5	7.1	5.0	8.0
Female	64.5	6.4	6.0	4.1	5.6	6.1	6.9	6.5	8.3	7.0	7.5
Age/gender											
Children, 2-3 ²	75.7	8.9	6.5	7.3	7.4	6.3	7.8	5.9	8.9	8.3	8.6
Children, 4-6	66.9	7.4	5.0	4.9	7.2	4.9	7.1	5.7	9.1	7.8	7.8
Children, 7-10	66.0	8.0	5.0	3.9	7.7	5.6	7.1	6.0	8.6	6.2	8.0
Females, 11-14	61.4	6.5	5.0	3.6	5.3	5.3	7.0	6.0	8.8	7.0	7.0
Females, 15-18	61.7	6.4	5.6	3.6	4.6	5.3	7.2	6.6	9.0	6.7	6.8
Females, 19-50	63.2	6.1	6.2	3.3	5.5	6.5	6.9	6.6	8.1	6.5	7.5
Females, 51+	66.6	6.4	6.4	5.3	5.3	6.2	6.8	6.7	8.1	7.7	7.7
Males, 11-14	60.8	7.0	4.8	2.7	6.1	5.7	7.3	6.2	8.1	5.9	7.2
Males, 15-18	59.9	7.0	5.1	2.5	6.1	6.8	7.2	6.3	7.0	4.4	7.5
Males, 19-50	61.3	6.6	6.0	2.7	6.1	7.5	6.9	6.6	6.7	4.2	7.9
Males, 51+	65.2	6.7	6.7	4.5	5.9	7.7	6.6	6.7	6.8	5.3	8.4
Race/ethnicity											
Non-Hispanic White	64.2	6.8	6.2	3.7	6.4	6.5	6.7	6.3	7.8	5.8	7.9
Non-Hispanic Black	61.1	6.2	5.2	3.7	4.5	7.0	7.0	6.9	7.4	6.3	7.0
Mexican American	64.5	6.5	5.6	4.1	5.5	6.7	7.3	6.8	7.3	6.8	7.8
Other race ³	63.4	6.6	5.9	3.8	4.0	6.7	7.5	7.3	8.1	6.3	7.2
Other Hispanic	64.2	6.6	5.4	3.8	5.7	6.6	7.7	7.1	7.8	6.0	7.6
Place of birth											
United States	63.5	6.7	6.0	3.6	6.1	6.6	6.8	6.3	7.7	5.9	7.7
Mexico	66.0	6.4	5.4	4.5	5.2	7.1	7.8	7.6	7.1	7.0	8.0
Other	65.7	6.3	5.8	4.6	5.1	6.6	7.9	7.7	7.8	6.1	7.8
Education⁴											
No high school diploma	61.1	6.0	5.5	3.3	4.9	6.9	6.9	6.8	7.2	6.6	7.1
High school diploma	63.0	6.3	6.3	3.7	5.8	7.1	6.6	6.3	7.4	5.7	7.9
More than high school diploma	65.3	6.7	6.7	4.0	6.3	7.0	6.7	6.8	7.5	5.5	8.2
Income as percent of poverty											
<100%	61.7	6.2	5.4	3.5	5.3	6.4	7.1	6.5	7.5	6.8	7.0
100-184%	62.6	6.6	5.6	3.4	5.7	6.3	7.0	6.5	8.0	6.3	7.2
>184%	65.0	6.8	6.3	4.0	6.3	6.7	6.8	6.5	7.7	5.7	8.2

¹One serving of meat equals 2.5 ounces of lean meat.

²Portion sizes were reduced to two-thirds of adult servings except for milk for children age 2-3.

³Consists of Asian, Pacific Islander, American Indian, and Alaskan Native.

⁴Consists of people age 25 and over only.

Note: The overall HEI score ranges from 0 to 100. HEI component scores range from 0 to 10. For each subgroup, component scores may not exactly equal the overall score because of rounding.

Table 3. Trends in the Healthy Eating Index, overall and component mean scores

	1989	1996	1999-2000
Overall	61.5	63.8	63.8
Components			
Grains	6.1	6.7	6.7
Vegetables	5.9	6.3	6.0
Fruits	3.7	3.8	3.8
Milk	6.2	5.4	5.9
Meat	7.1	6.4	6.6
Total fat	6.3	6.9	6.9
Saturated fat	5.4	6.4	6.5
Cholesterol	7.5	7.9	7.7
Sodium	6.7	6.3	6.0
Variety	6.6	7.6	7.7

Certain segments of the American population had a diet of poorer quality than did other groups. This underscores the need to tailor nutrition policies and programs to meet the needs of different segments of the population, particularly those at a higher risk of having a poor diet.

Based on the demographic and socioeconomic characteristics examined, no subgroup of the population had an average HEI score greater than 80—a score that implies a good diet. Certain segments of the American population had a diet of poorer quality than did other groups. This underscores the need to tailor nutrition policies and programs to meet the needs of different segments of the population, particularly those at a higher risk of having a poor diet.

Trends in the Healthy Eating Index

How has the quality of the American diet changed over time? Our results show that it has improved slightly since 1989, but it has not changed since 1996 (table 3). People's diets were in the "needs improvement" range during all 3 years the HEI was computed. In 1989, the mean HEI score was 61.5. In 1996 and 1999-2000, it was 63.8—a 4-percent increase from 1989. Saturated fat and variety scores increased steadily over the three periods, and sodium scores decreased steadily. Grains, fruits, and total fat scores increased

from 1989 to 1996 and then remained constant through 1999-2000. Whereas vegetables and cholesterol scores increased from 1989 to 1996 and decreased thereafter, milk and meat scores decreased from 1989 to 1996 and increased thereafter. The steady decrease in the sodium score (as a result of greater sodium intake) may be related to the increase in the grains score: grain products contribute large amounts of dietary sodium to the diet (Saltos & Bowman, 1997). Because of changes since 1989 in how servings of the food groups are calculated, food group scores in 1996 and 1999-2000 may be smaller than they would be if the same method for calculating the 1989 HEI had been used. Hence, the improvement in people's diets over time is likely greater than what is reported here.

The increase in the HEI from 1989 to 1999-2000 may be due to several factors: the Food Guide Pyramid was introduced, the *Dietary Guidelines for Americans* were revised, and the Nutrition Labeling and Education Act was enacted. These initiatives were aimed at improving the eating habits of Americans. Also, since 1989, many

people became more aware of the health benefits of a better diet that have been promoted through various campaigns, such as 5 A Day. That the HEI has not improved from 1996 to 1999-2000 highlights the need for continual as well as new nutrition initiatives.

Conclusions

Americans' eating patterns, as measured by the HEI, have improved slightly since 1989 but have not changed from 1996 to 1999-2000. In all three periods, the average HEI score indicated that the diets of most Americans need to improve, and during the latest period, only 10 percent of Americans had a good diet. Of the 10 components of the HEI, cholesterol was the one where the highest percentage (69 percent) of people had a maximum score of 10—that is, they met the dietary recommendation. Fifty-five percent had a maximum score for variety. For the other 8 components of the HEI, only 17 to 41 percent of the population met the dietary recommendations on a given day.

Gender, age, race/ethnicity, place of birth, education, and income are factors that influence diet quality. In general, children less than age 11 had a better diet than did others. Possibly, parents are more attentive to children's diets. Adults over age 50, females, and those with more education and income had a better diet, compared with their counterparts; whereas, non-Hispanic Blacks had a poorer quality diet than did other racial/ethnic groups. The average HEI score of people by selected characteristics, however, still indicated that Americans' diets need to improve.

USDA is committed to improving the Nation's nutrition and health by promoting more healthful eating habits and lifestyles and improving access to nutritious foods. USDA will continue to use its "broader nutrition education efforts as key opportunities to promote more healthful eating and physical activity across the Nation" (USDA, 2002, p. 19) and use the HEI as an indicator of healthful dietary patterns.

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More Than One in Three Older Americans May Not Drink Enough Water

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With contributions from the USDA
Center for Nutrition Policy and Promotion
Aging Interest Group

Introduction

Whether drunk from the tap or a bottle or eaten in foods, water has important health benefits. Insufficient consumption can lead to muscle spasm, renal dysfunction, increased risk of bladder cancer, and even death. Because adequate water consumption is important, the Institute of Medicine (a member of the National Academies), through its Food and Nutrition Board, is developing Dietary Reference Intakes (DRI) for water and electrolytes. (The new DRIs are superseding the old Recommended Dietary Allowances, or RDAs.)

The traditional recommendation for adequate water consumption for adults is "at least 8 glasses of water a day." However, no scientific research has examined the relationship between health risk and this traditional recommendation. Also, little scientific study has been published that compared traditional and other current recommendations of water consumption among healthy, free-living older adults.

Because the elderly are especially at risk of dehydration, we examined total water consumption from the moisture contained in foods and beverages as well as from plain water. We used data from three national surveys: (1) the Third National Health and Nutrition Examination Survey, 1988-1994 (NHANES III); (2) the 1994-96 Continuing Survey of Food Intakes

by Individuals (CSFII 94-96); and (3) the National Health and Nutrition Examination Survey, 1999-2000 (NHANES 99-2000). Our sample consisted of 4,818 adults ages 60 or older from NHANES III, 3,092 from CSFII, and 1,391 from NHANES 99-2000. Body weight was self-reported in the CSFII but was measured by a trained examiner in both NHANES surveys. Self-reported intake data were based on 1-day dietary recall in all three surveys. The results reported in this study are weighted to reflect the U.S. elderly population.

Importance of Water Consumption

Water is the most abundant and essential component or macronutrient in the human body. It comprises, on average, about 60 percent of total body weight for young adults and about 50 percent for the elderly. Various body components account for different percentages of the body's water content; generally, water constitutes 65 to 75 percent of muscle weight and 50 percent of body fat weight. The proportion of body water is generally smaller in females, the elderly, and the obese because of the smaller portion of muscle mass in these populations.

The human body cannot store water; therefore, fluid must be replaced and

kept in balance daily. Body water turnover rate is estimated to be 4 percent of total body weight to maintain normal body functions, which include excretion of body waste and evaporation from the lungs and skin. Recommendations for adequate water intake by adults are generally based upon several factors: humidity, temperature, altitude, exercise status, and use of diuretic medications.

Dehydration in the Elderly

Dehydration occurs when water balance is negative; that is, intake of water is less than its loss (McArdle, Katch, & Katch, 1996). This issue is especially pertinent to older adults when total available body water has decreased because of losses in muscle mass, changes in the cells as people age, less efficient kidney function, and reduced thirst sensation. Thirst is usually the most important mechanism used to increase water consumption. When the volume of body water decreases, thirst signals the brain and triggers the person to consume fluids. Older adults, compared with other segments of the population, have impaired responses to reduced body water; thus, they are most vulnerable to dehydration.

Recommendations for Water Intake

For adults whose energy expenditure and environmental exposure are average, the Food and Nutrition Board recommends 1 ml of water per kilocalorie expenditure (or, at 237 ml per 8 fluid ounces, 4.2 glasses per 2,000 kilocalories) as a general guideline for total water consumption (National Research Council, 1989). Chernoff (1999) recommends a total fluid intake of 30 ml/kg body weight (or 0.06 glasses per pound of body weight)

Table 1. Median daily total water consumption by adults ages 60 years or older

	Plain water (8 fl. oz. glasses) ¹	Moisture (8 fl. oz. glasses) ²	Total water (8 fl. oz. glasses)	Total water (8 fl. oz. glasses)/pound body weight
Did not meet the recommendation ³				
NHANES III N=1,444 (30%)	2.0	5.3	7.7	0.05
CSFII 1994-96 N=1,351 (44%)	2.0	5.1	7.2	0.04
NHANES 1999-2000 N=1,520 (37%)	2.7	5.1	8.1	0.05
Met the recommendation ³				
NHANES III N=3,374 (70%)	5.5	7.6	13.2	0.08
CSFII 1994-96 N=1,741 (56%)	4.0	7.5	11.9	0.08
NHANES 1999-2000 N=871 (63%)	5.6	7.6	13.5	0.08

¹Plain water includes bottled, spring, or tap water.

²Moisture is the water from all foods and beverages, except from plain water.

³The recommendation is 0.06 glasses per pound of body weight.

and with a minimum of 1,500 ml (6.3 glasses) per day. We use this criterion to assess the adequacy of water intake by the elderly U.S. population.

More Than One-Third of Older Adults Have Inadequate Water Consumption

About 30 percent of subjects from NHANES III and 37 percent from NHANES 99-2000 did not meet the recommendation of 30 ml/kg body weight (0.06 glasses per pound of body weight) for total water consumption (table 1). Forty-four percent of the subjects from the CSFII 94-96 did not

meet this recommendation. Among older adults who did not meet the recommendation, the median total water consumption was about 0.05 glasses per pound of body weight in all three national surveys, compared with 0.08 glasses per pound of body weight among their counterparts who met the recommendation. Additionally, those not meeting the recommendation drank about two to three times less plain water and consumed about 1.5 times less moisture from foods and beverages than did those meeting the recommendation. However, based on this study, over half of older adults ages 60 years or older who met the recommendation of 0.06 glasses per pound of body weight consumed from 12 to 13.5 glasses of total water daily, including about 4 to 5.6 glasses from plain water.

Conclusion

Based on the analysis data and the particular criterion used, more than one in three Americans over the age of 60 may not be consuming enough total water from all sources.

In addition to drinking plenty of plain water every day, eating foods with a high moisture content—such as fruits and vegetables—could be a good way to increase total water consumption. Water constitutes 90 percent of most fruits and vegetables and about 50 percent of meats and cheese.

Valtin (2002) suggests that caffeinated drinks (e.g., coffee and soft drinks) and alcoholic beverages may also count towards daily consumption of fluid. However, because of the diuretic effects of these types of beverages, additional plain water should be consumed to replace the water that is lost.

Further investigation of the recommendation for optimal water consumption by older adults should focus on different physiological needs. For example: Living arrangements, physical activity, and medications can affect water consumption and physiological needs. In addition, intakes of electrolytes can also affect the hydration status of a person.

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Federal Studies

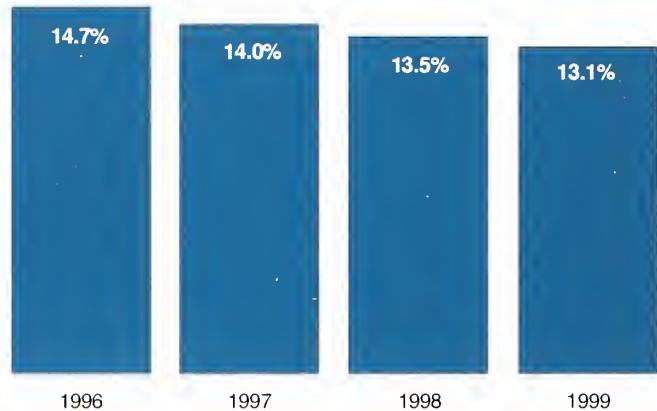
Who Gets Assistance?

Changes in the welfare system have increased the interest in information about the degree to which certain groups of people are involved in assistance programs, about the characteristics of program participants, about the types of programs they use, and about the intensity and extent of their participation. Of particular interest is how people's participation extends over time. This report focuses on participation and on the characteristics of participants in the following major means-tested public assistance programs: (1) Aid to Families with Dependent Children (AFDC) and Temporary Assistance for Needy Families (TANF), (2) General Assistance (GA), (3) Food Stamps, (4) Supplemental Security Income (SSI), (5) Medicaid, and (6) housing assistance. The data are from the 1996 panel of the Survey of Income and Program Participation (SIPP). The 1996 SIPP panel covered the period from January 1996 to December 1999 and provided data on the civilian noninstitutionalized population of the United States.

Assistance program participation declines

In 1999, about 36 million people or 13.1 percent of the population participated in one or more major means-tested assistance programs, on average, during each month. This represents a decline from the 1996 average monthly participation rate of 14.7 percent. A small proportion of the population (6.5 percent) participated in means-tested programs each month of the 1996-99 period.

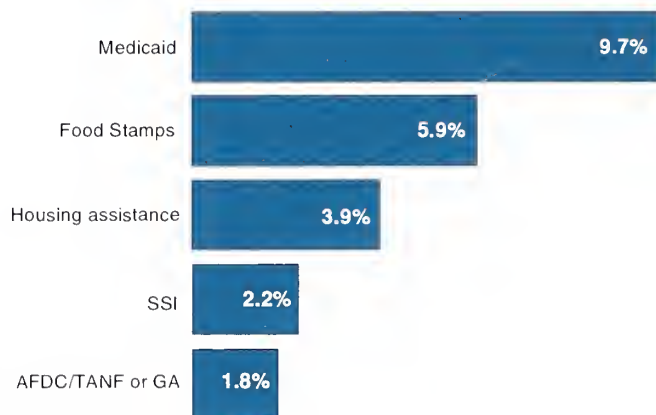
Average monthly participation rates in major means-tested programs



Medicaid has the highest participation rate

People were more likely to participate in Medicaid than in any other program. The average monthly participation rate in 1999 for Medicaid was 9.7 percent, compared with 1.8 to 5.9 percent for the other programs. Of the 27 million people receiving Medicaid benefits in an average month of 1999, about 12 million were children.

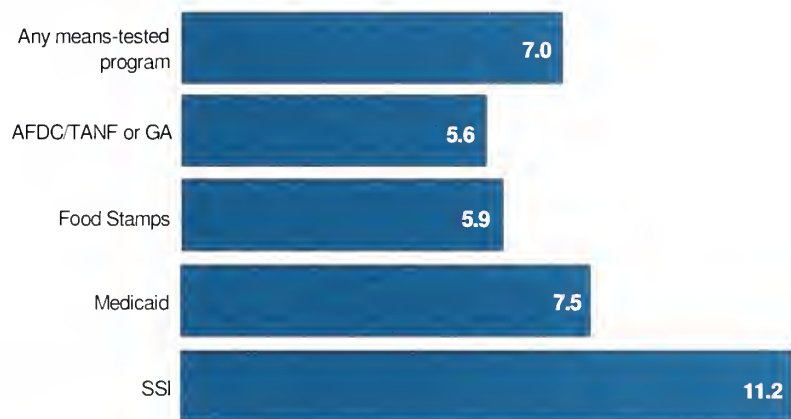
Average monthly participation rates in means-tested programs, 1999



Duration of spells of participation differs by program

For people who received assistance during the 1996-99 period, the median spell length, in general, was 7.0 months. The median spell length for SSI was 11.2 months, significantly longer than that for Food Stamps, AFDC/TANF or GA, or Medicaid (5.9, 5.6, and 7.5 months, respectively).

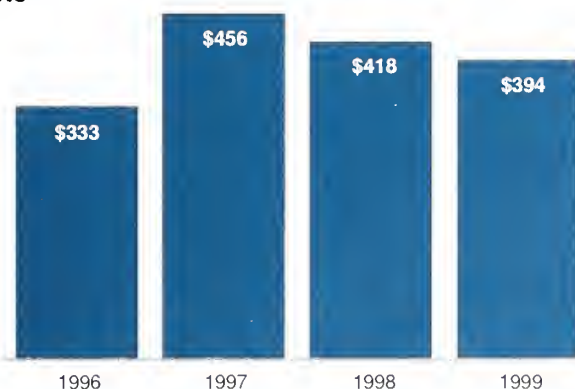
Median spell length in months, by program, 1996-99



Median monthly benefit level (in 1999 dollars) varies over years

The median monthly family benefit of AFDC/TANF or GA, SSI, and Food Stamps was \$394 in 1999, compared with \$333 to \$456 (in 1999 dollars) in 1996-98. Benefits differed by population groups. In 1999, children under 18 years old received a median monthly family benefit of \$429, significantly greater than the \$269 for the elderly. Children also had a higher average monthly participation rate.

Median monthly family benefits (in 1999 dollars) of program participants¹



¹Consists of AFDC/TANF or GA, SSI, and Food Stamps only.

Source: Lester, G.H., & Tin, J. (2004). *Dynamics of economic well-being: Program participation, 1996-99: Who gets assistance? Current Population Reports (P70-94)*. Washington, DC: U.S. Census Bureau.

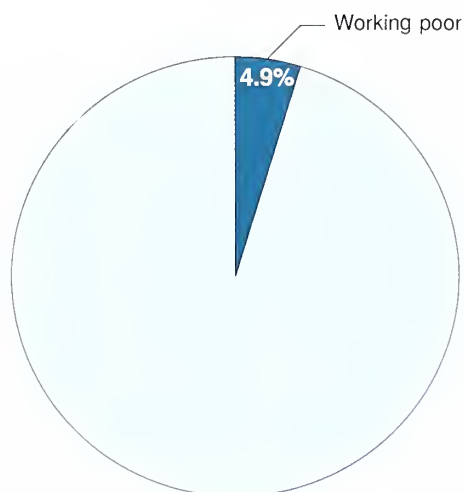
The Working Poor in 2001

A number of the poor also participate significantly in the labor force. In 2001, 32.9 million people of all ages, or 11.7 percent of the population, lived at or below the official poverty threshold. Most of them were children or adults who had not participated in the labor force during the year. However, many were 16 years old and older and were in the labor force for 27 weeks or more during the year. These individuals are typically referred to as the working poor. This study presents data on the relationships between labor force activity and poverty in 2001 for individual workers, including those who were family members and those who did not live with their families. A variety of economic, demographic, educational, occupational, and family characteristics of the working poor are explored. For the most part, the data used in this study were collected in the 2002 Annual Social and Economic Supplement to the Current Population Survey.

Working poor totals 6.8 million people

About 6.8 million people were classified as the working poor. They represented 4.9 percent of all persons 16 years and older who were in the labor force for 27 weeks or more in 2001—an increase of 319,000 (0.2 percentage point) from the previous year.

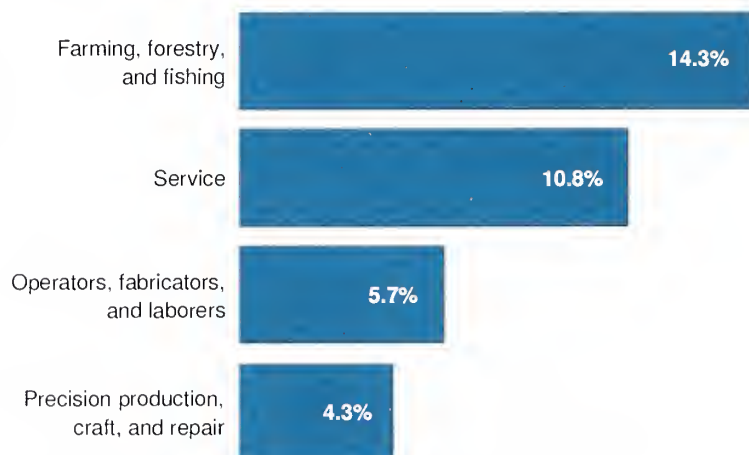
Percentage of people in the labor force and also in poverty



Service and farmworkers more likely to be among working poor

Farmworkers (including those employed in forestry and fishing) and service employees were more likely to be classified as working poor than were workers in other occupations. The 2 million working poor in service occupations accounted for 31.3 percent of all those classified as the working poor.

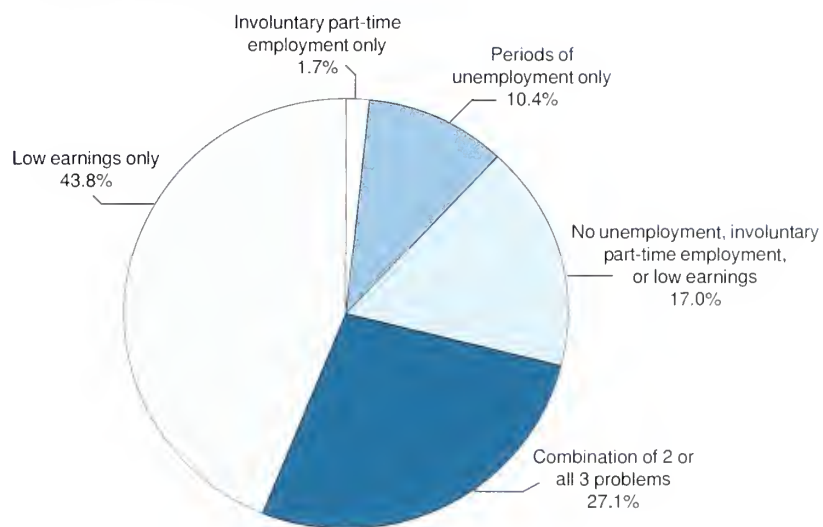
Poverty rate of people in the labor force, by selected occupations



Low earnings most common among working poor

For the working poor, low earnings was the most common labor-market condition encountered, with 44 percent facing low earnings only. Seventeen percent of the working poor did not experience low earnings, involuntary part-time employment, or periods of unemployment: Their status was likely attributed to short-term employment, some weeks of involuntary part-time work, or a family structure that increases the risk of poverty.

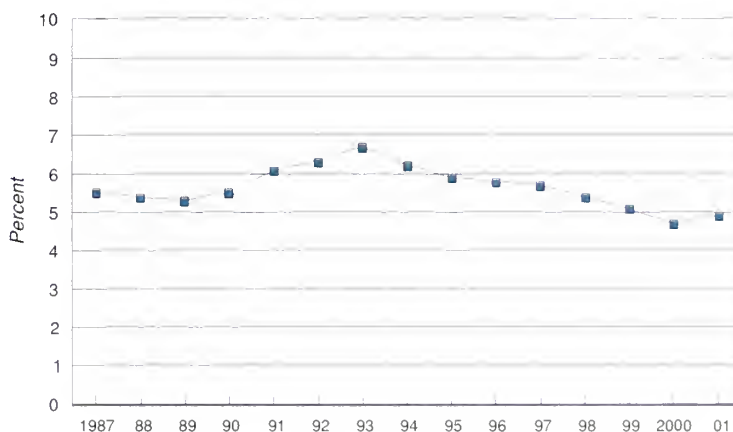
Labor market problems of working poor



Poverty rate of those in labor force at peak in 1993

The rise in the percentage of people classified as the working poor in 2001 was the first year-to-year increase since 1992-93. During the 1987-2001 period, poverty rates of people who were in the labor force for 27 weeks or more peaked in 1993 at 6.7 percent and was lowest in 2000 at 4.7 percent.

Poverty rates of people in the labor force



Source: Mosisa, A. (2003). *The working poor in 2001*. *Monthly Labor Review*, 126(11/12), 13-17.

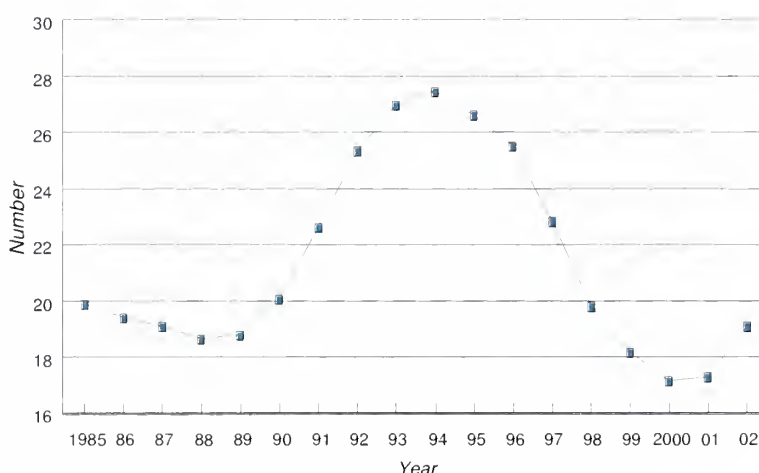
Food Stamp Households: 2002

The Food Stamp Program (FSP) provides Americans with the means to purchase food for a nutritious diet. The FSP is the largest of the 15 domestic food and nutrition assistance programs administered by the U.S. Department of Agriculture's Food and Nutrition Service (FNS). In an average month in fiscal year 2002, the FSP provided benefits to about 19 million people living in 8.2 million U.S. households. The total cost of the program over fiscal year 2002 was \$20.7 billion, \$18.3 billion of which were for food stamp benefits. This report presents the characteristics of U.S. food stamp households in fiscal year 2002 (October 2001 to September 2002). This information comes from FSP household data collected by FNS for quality control purposes.

Food stamp participation increases from 2001 to 2002

After declining slowly from 1985 to 1989, FSP participation grew substantially during the early 1990s, increasing by 37 percent from fiscal year 1990 through 1994. Since peaking at 28 million people in March 1994, the number of FSP participants declined steadily through 2000 but began to rise in 2001 and rose further in 2002. There were 18.2 million participants at the beginning of fiscal year 2002, rising to 19.8 million by the end of the fiscal year.

Number of Food Stamp Program participants (in millions)¹

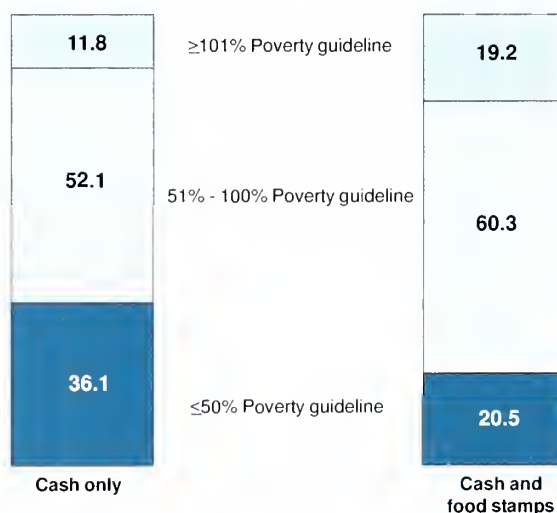


¹Average monthly values.

Food stamps increase households' purchasing power

The combination of cash and food stamps yields a significantly different distribution of food stamp households by poverty status. Specifically, when food stamps are included in gross income, the resulting increase in income of food stamp households was enough to move 7 percent of them above the poverty guideline in 2002. Food stamp benefits had an even greater effect on the poorest food stamp households, moving 16 percent of them above 50 percent of the poverty guideline.

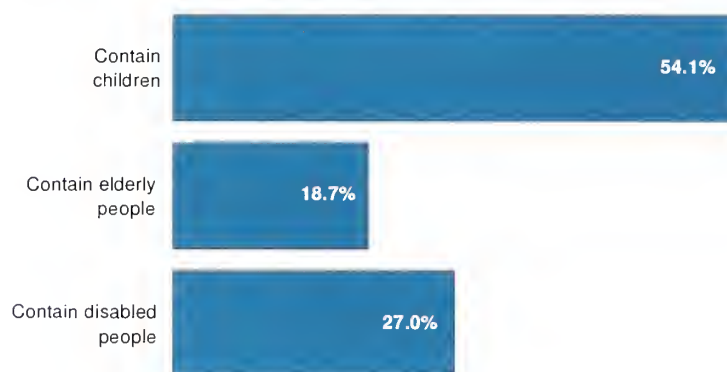
Income distribution of food stamp households, based on cash only and cash and food stamps



More than half of food stamp households contain children

In fiscal year 2002, 54 percent of FSP households contained children; these households tended to be headed by a single female. Nineteen percent of FSP households contained elderly people (age 60 or older); these households tended to consist of people living alone. Twenty-seven percent of all FSP households contained disabled people; about 59 percent of these households consisted of people living alone.

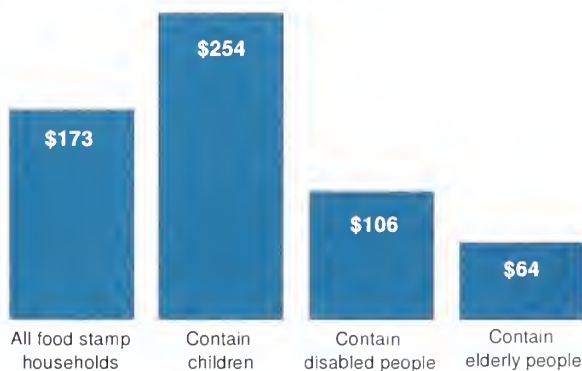
Characteristics of food stamp households



Average monthly food stamp benefit: \$173

The average monthly food stamp benefit was \$173 in 2002 for all food stamp households. This value varied among household types by household size. Food stamp households with children had a greater monthly benefit and household size (\$254 and 3.3 people) than did food stamp households with elderly people (\$64 and 1.3 people) or those with disabled people (\$106 and 2.0 people).

Average monthly food stamp benefit, by food stamp household characteristic



Source: U.S. Department of Agriculture, Food and Nutrition Service, Office of Analysis, Nutrition and Evaluation. (2003). *Characteristics of Food Stamp Households: Fiscal Year 2002*. FSP-03-CHAR02.

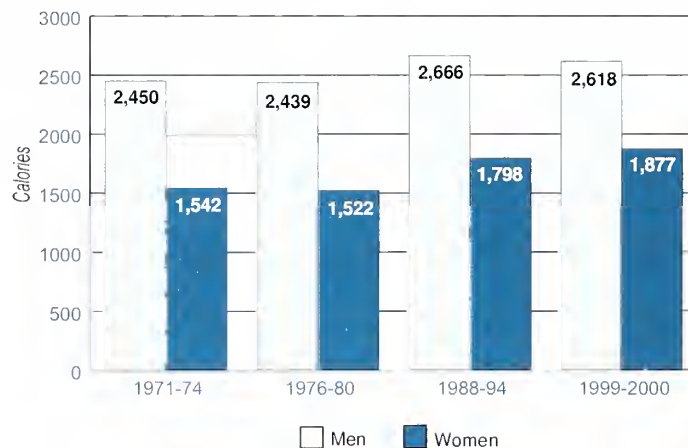
Trends in Intake of Energy and Macronutrients

During 1971-2000, the prevalence of obesity in the United States increased from 14.5 to 30.9 percent. Unhealthful diets and sedentary behaviors have been identified as the primary causes of deaths attributable to obesity. Evaluating trends in dietary intake is an important step in understanding the factors that contribute to the increase in obesity. To assess trends in intake of energy (i.e., calories), protein, carbohydrate, total fat, and saturated fat during 1971-2000, the Centers for Disease Control and Prevention (CDC) analyzed data from four National Health and Nutrition Examination Surveys conducted during 1971-74, 1976-80, 1988-94, and 1999-2000. All the surveys included a dietary recall interview to obtain information on food and beverages consumed during the preceding 24 hours. This report summarizes the results of that analysis. To compare estimates across surveys, CDC conducted analysis that included only adults ages 20 to 74 years. Samples ranged from 1,730 men and 2,003 women in 1990-2000 to 6,630 men and 7,537 women in 1988-94.

Energy intake up

During 1971-2000, average energy intake increased significantly. For men, average energy intake increased from 2,450 to 2,618 calories and for women, from 1,542 to 1,877 calories.

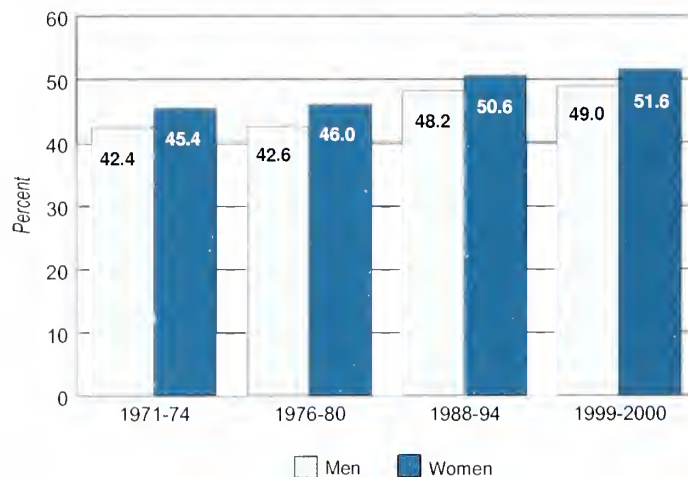
Mean energy intake among adults over time, by gender



Percentage of calories from carbohydrate also up

For men, the percentage of calories from carbohydrate increased from 42.4 to 49.0 percent between 1971-74 and 1999-2000. For women, the percentage increased from 45.4 to 51.6 percent over this time.

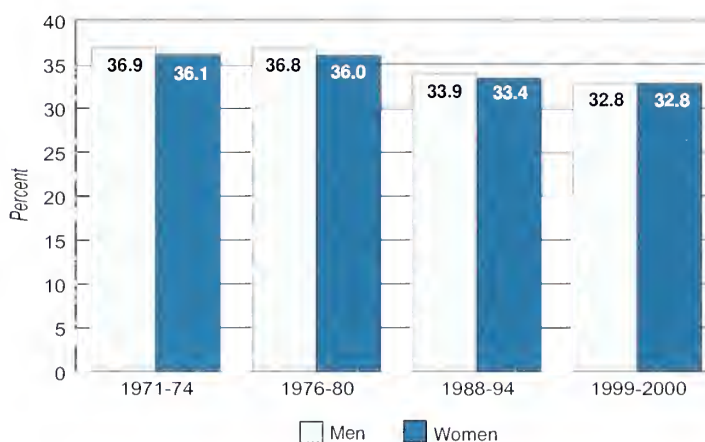
Percentage of calories from carbohydrate among adults over time, by gender



Percentage of calories, however, from total fat down

The percentage of calories from total fat decreased from 36.9 to 32.8 percent for men between 1971-74 and 1999-2000 and from 36.1 to 32.8 percent for women. The decrease in the percentage of calories from fat during 1971-91 is attributed to an increase in total calories consumed; absolute fat intake in grams increased.

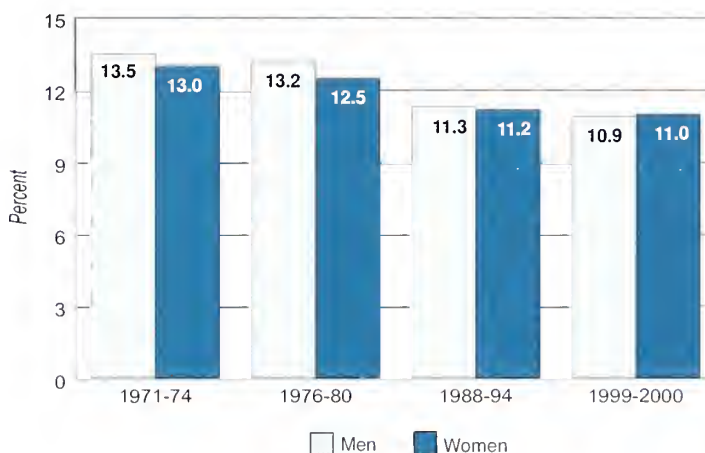
Percentage of calories from total fat among adults over time, by gender



Percentage of calories from saturated fat also down

The percentage of calories from saturated fat decreased from 13.5 to 10.9 percent for men between 1971-74 and 1999-2000. For women, the percentage decreased from 13.0 to 11.0 percent over this time.

Percentage of calories from saturated fat among adults over time, by gender



Source: Wright, J.D., Kennedy-Stephenson, J., Wang, C.Y., McDowell, M.A., & Johnson, C.L. (2004). Trends in intake of energy and macronutrients—United States, 1971-2000. *Morbidity and Mortality Weekly Report*, 53(4), 80-82.

Journal Abstracts

The following abstracts are reprinted verbatim as they appear in the cited source.

Besser, T. (2003). New economy businesses in rural, urban, and metropolitan locations. *Rural Sociology*, 68(4), 531-553.

The service sector has replaced manufacturing as the primary employer in the United States. Fastest growing within this sector are producer services, i.e., those businesses that provide service inputs to other businesses and government. Theorists posit that the propensity of producer services to locate in metro areas advantages cities in relation to rural areas. They argue that significant numbers of producer services are unlikely to locate in rural areas due to the economic and cultural benefits offered by central cities and that producer services in rural locations are qualitatively different from metro firms. Perceptions of the environment, management strategies, and community citizenship were analyzed with data from 259 producer service business owners and managers in Iowa rural, urban, and metropolitan communities. The findings point to qualitative differences between the businesses based on community size, but also many similarities were found. Rural producer services reported more community citizenship than other businesses.

Carpenter, R.A., Finley, C., & Barlow, C.E. (2004). Pilot test of a behavioral skill building intervention to improve overall diet quality. *Journal of Nutrition Education and Behavior*, 36, 20-26.

Objective: To determine the effect of a cognitive and behavioral skills building intervention delivered via a small group or correspondence on improvement in total diet quality.

Design: Randomized, controlled trial comparing 2 intervention groups with a usual care (UC) group.

Participants: Generally healthy men ($n = 35$) and women ($n = 63$); mean age = 49.6 years (range = 29 to 71 years).

Intervention: 20-session behavioral and cognitive skills curriculum to train participants to improve personal dietary habits that were inconsistent with public health guidelines. One group (weekly meeting [WM]) met in small groups with 2 cofacilitators. A correspondent (CR) group received the curriculum via mail and an interactive study Web site. The UC group received a copy of a consumer nutrition book.

Main Outcome Measure: Modified Healthy Eating Index (MHEI) score derived from 9 components of the US Department of Agriculture's Healthy Eating Index.

Results: The WM group significantly improved their MHEI score compared with the CR ($P = .04$) and UC ($P = .002$) groups. The CR group's improvement in MHEI score was not significantly different from that of the UC group ($P = .19$).

Conclusions and Implications: A behaviorally focused intervention can improve overall diet quality, especially if delivered through small-group meetings.

Green, G.P., & Mayhew, C. (2003). Hiring welfare recipients: Employer practices and experiences. *Journal of Poverty*, 7(4), 37-51.

We examine employer hiring practices and experiences related to hiring former welfare recipients in Wisconsin. Data for this analysis were collected from phone surveys of a stratified random sample of 1,266 Wisconsin employers.

We conduct analyses of previous and anticipated demand for employers that have hired or are planning to hire welfare recipients. We find a relatively high level of previous and prospective demand for hiring former welfare recipients. Most employers report that the chances for promotion are either good or excellent, but about one-third of the employers said that the chances for promotion were fair or poor. The most serious problem reported by employers with hiring former welfare recipients is with absenteeism and tardiness, with one-half of the employers reporting a problem. The starting salary for the average welfare hire is \$12,743 per year. About one-third of the recent hires, however, are working part-time (less than 35 hours per week). Employers in Milwaukee with a large number of women employees, a high vacancy rate and a large number of unskilled positions are likely to hire more former welfare recipients.

Gunther, S., Patterson, R.E., Kristal, A.R., Stratton, K.L., & White, E. (2004). Demographic and health-related correlates of herbal and specialty supplement use. *Journal of the American Dietetic Association*, 104, 27-34.

Background. By broadening the definition of a dietary supplement, the 1994 Dietary Supplements Health and Education Act opened the market to many herbals, botanicals, and other food ingredients that would have otherwise needed safety testing before being sold. Information regarding patterns and correlates of herbal and specialty supplement use can help nutritionists understand which compounds are most commonly used, who

are likely to use these supplements, and whether the choice of herbal supplements appears motivated by specific health concerns.

Methods. Data are from 61,587 participants, aged 50 to 76 years, who completed a self-administered mailed questionnaire in 2000-2002 on current dietary supplement use (20 herbal/specialty supplements, multivitamins, and 17 individual vitamins or minerals), demographic and lifestyle characteristics, and medical history.

Results. When compared with no supplement use, herbal/specialty supplement use was significantly higher among respondents who were older, female, educated, had a normal body mass index, were nonsmokers, engaged in exercise, and ate a diet lower in fat and higher in fruits and vegetables (all $P < .001$). Similar trends were observed when herbal/specialty supplement users were compared with vitamin/mineral users. For specific supplements and medical conditions, the strongest associations were cranberry pills and multiple bladder infections (odds ratio [OR], 4.66; 95% confidence interval [CI], 4.03-5.38), acidophilus pills and lactose intolerance (OR, 3.37; 95% CI, 2.96-3.84), and saw palmetto and enlarged prostate (OR, 3.33; 95% CI, 3.00-3.72).

Conclusions. Odds of supplement use are high for certain demographic and lifestyle characteristics. Additionally, persons with specific medical conditions are using supplements promoted to reduce risk for their particular conditions.

Sahn, D.E., & Stifel, D. (2003). Exploring alternative measures of welfare in the absence of expenditure data. *Review of Income and Wealth*, 49(4), 463-490.

We consider an asset-based alternative to the standard use of expenditures in defining well-being and poverty. Our

motivation is to see if there exist simpler and less demanding ways to collect data to measure economic welfare and rank households. This is particularly important in poor regions where there is limited capacity to collect consumption, expenditure and price data. We evaluate an index derived from a factor analysis on household assets using multipurpose surveys from several countries. We find that the asset index is a valid predictor of a crucial manifestation of poverty—child health and nutrition. Indicators of relative measurement error show that the asset index is measured as a proxy for long-term wealth with less error than expenditures. Analysts may thus prefer to use the asset index as an explanatory variable or as a means of mapping economic welfare to other living standards and capabilities such as health and nutrition.

Shlay, A.B., Weinraub, M., Harmon, M., & Tran, H. (2004). Barriers to subsidies: Why low-income families do not use child care subsidies. *Social Science Research*, 33, 134-157.

Child care affordability is a problem for low-income families. Child care subsidies are intended to reduce child care expenses and promote parental employment for poor families. Yet many families fail to utilize the child care subsidies for which they are eligible. This research investigates barriers to utilizing child care subsidies. Found barriers include parents' beliefs that they either did not need or were not eligible for subsidy. Knowingly eligible families avoided applying for subsidies because of hassles and restrictions, real or perceived, associated with accessing the subsidy system. Even families receiving subsidies were confused about subsidy regulations. The major predictors of subsidy use were prior welfare experience, single parenthood, family/household income, hours of

employment, use of center care and in-home care, and receipt of court ordered child support. Policy recommendations include developing better methods for disseminating information about subsidy eligibility and reducing barriers associated with specific subsidy regulations.

Wansink, B. (2003). How do front and back package labels influence beliefs about health claims? *Journal of Consumer Affairs*, 37(2), 305-316.

One dilemma with health claims is that too much information can confuse consumers and too little information can mislead them. A controlled study is used to examine the effectiveness of various front-sided health claims when used in combination with a full health claim on the back of a package. The results indicate that combining short health claims on the front of a package with full health claims on the back of the package leads consumers to more fully process and believe the claim. The basic finding that using two sides of a package (short claim on front; long on back) increases the believability of health claims is relevant for policy-makers, consumers, and researchers.

Official USDA Food Plans: Cost of Food at Home at Four Levels, U.S. Average, April 2004¹

AGE-GENDER GROUPS	WEEKLY COST ²				MONTHLY COST ²			
	Thrifty plan	Low-cost plan	Moderate-cost plan	Liberal plan	Thrifty plan	Low-cost plan	Moderate-cost plan	Liberal plan
INDIVIDUALS³								
CHILD:								
1 year	\$17.40	\$21.70	\$25.50	\$31.20	\$75.60	\$94.20	\$110.30	\$135.10
2 years	17.40	21.40	25.40	30.80	75.20	92.70	109.90	133.40
3-5 years	19.00	23.50	29.10	35.20	82.30	102.00	126.20	152.40
6-8 years	23.80	31.60	39.10	45.50	103.00	137.10	169.30	197.30
9-11 years	27.80	35.60	45.40	52.90	120.70	154.30	196.90	229.20
MALE:								
12-14 years	28.90	40.20	49.70	58.50	125.40	174.00	215.50	253.60
15-19 years	29.80	41.30	51.70	60.00	129.10	179.10	224.10	260.10
20-50 years	32.00	41.40	51.60	62.90	138.40	179.30	223.50	272.50
51 years and over	29.10	39.50	48.60	58.40	126.10	171.00	210.70	253.00
FEMALE:								
12-19 years	28.90	34.70	42.20	50.90	125.40	150.30	182.90	220.30
20-50 years	29.00	36.10	44.20	56.90	125.70	156.50	191.30	246.50
51 years and over	28.50	35.10	43.70	52.40	123.50	152.00	189.50	226.90
FAMILIES:								
FAMILY OF 2⁴:								
20-50 years	67.10	85.30	105.30	131.70	290.50	369.40	456.30	570.90
51 years and over	63.40	82.00	101.60	121.80	274.60	355.20	440.20	527.80
FAMILY OF 4:								
Couple, 20-50 years and children—								
2 and 3-5 years	97.30	122.40	150.20	185.70	421.70	530.50	650.90	804.70
6-8 and 9-11 years	112.60	144.80	180.20	218.20	487.70	627.30	781.00	945.50

¹Basis is that all meals and snacks are purchased at stores and prepared at home. For specific foods and quantities of foods in the Thrifty Food Plan, see *Family Economics and Nutrition Review*, Vol. 13, No. 1 (2001), pp. 50-64; for specific foods and quantities of foods in the Low-Cost, Moderate-Cost, and Liberal Plans, see *The Low-Cost, Moderate-Cost, and Liberal Food Plans, 2003 Administrative Report* (2003). All four Food Plans are based on 1989-91 data and are updated to current dollars by using the Consumer Price Index for specific food items.

²All costs are rounded to nearest 10 cents.

³The costs given are for individuals in 4-person families. For individuals in other size families, the following adjustments are suggested: 1-person—add 20 percent; 2-person—add 10 percent; 3-person—add 5 percent; 4-person—no adjustment; 5- or 6-person—subtract 5 percent; 7- (or more) person—subtract 10 percent. To calculate overall household food costs, (1) adjust food costs for each person in the household and then (2) sum these adjusted food costs.

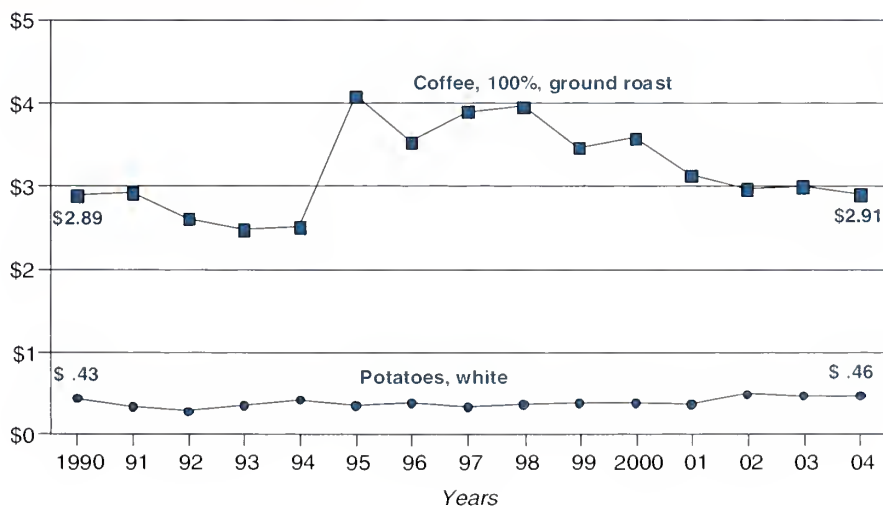
⁴Ten percent added for family size adjustment.

Consumer Prices

Average percent change for major budgetary components

Group	Annual average percent change from December of previous year to December:			Percent change 12 months ending with April 2004
	1990	1995	2000	
All Items	6.1	2.5	3.4	2.3
Food	5.3	2.1	2.8	3.4
Food at home	5.8	2.0	3.0	3.8
Food away from home	4.5	2.2	2.4	2.8
Housing	4.5	3.0	4.3	2.3
Apparel	5.1	0.1	-1.9	0.3
Transportation	10.4	1.5	4.3	1.6
Medical care	9.6	3.9	4.2	4.7
Recreation	NA	2.8	1.4	1.5
Education and communication	NA	4.0	1.2	1.7
Other goods and services	7.6	4.3	4.5	1.8

Price per pound for potatoes and coffee, as of April in each year



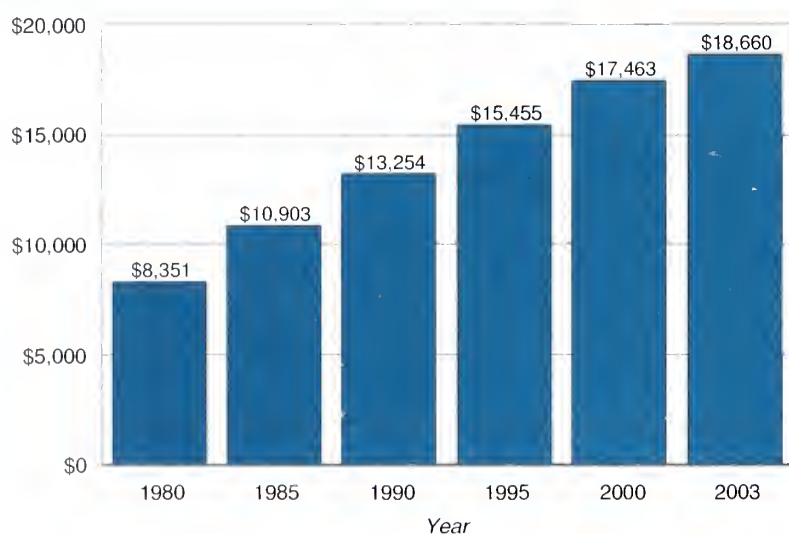
U.S. Poverty Thresholds and Related Statistics

Poverty Thresholds in 2003, by size of family and number of related children under age 18

Size of family unit	Related children under age 18								Eight or more
	None	One	Two	Three	Four	Five	Six	Seven	
One person									
Under age 65	\$9,573								
Age 65 and over	8,825								
Two people									
Householder under age 65	12,321	\$12,682							
Householder age 65 and over	11,122	12,634							
Three people	14,393	14,810	\$14,824						
Four people	18,979	19,289	18,660	\$18,725					
Five people	22,887	23,220	22,509	21,959	\$21,623				
Six people	26,324	26,429	25,884	25,362	24,586	\$24,126			
Seven people	30,289	30,479	29,827	29,372	28,526	27,538	\$26,454		
Eight people	33,876	34,175	33,560	33,021	32,256	31,286	30,275	\$30,019	
Nine people or more	40,751	40,948	40,404	39,947	39,196	38,163	37,229	36,998	\$35,572

Source: U.S Census Bureau, January 2004.

Poverty thresholds over time for a family of four (including two children)



Source: U.S Census Bureau, January 2004.



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Guidelines for Submissions to *Family Economics and Nutrition Review*

Family Economics and Nutrition Review (FENR) is a semi-annual journal published by the Center for Nutrition Policy and Promotion, United States Department of Agriculture. Research articles and briefs are peer-reviewed. We will consider manuscripts concerning economic and nutritional issues related to the health and well-being of U.S. families. We are especially interested in studies about U.S. population groups at risk—from either an economic or a nutritional perspective. Research may be based on primary or secondary data as long as it is national or regional in scope or of national policy interest. Subject matter should be based on research findings of interest to a wide family economics and nutrition audience, including Federal, State, and local government officials, nutrition and economic educators, and social scientists.

Your submission should contain the following:

- ◆ an affiliation page that lists the author's(s') full name, academic degree(s), employer, and title. This list of names must consist only of those who had an instrumental role in developing the manuscript being submitted.
- ◆ a short abstract (150 words) that summarizes the major findings. Abstracts are required for research articles, not for research briefs.
- ◆ text of 12 to 20 double-spaced pages for research articles or 5 to 10 double-spaced pages for research briefs. Tables are single spaced. Articles over 20 pages in length will be considered by the FENR editorial staff only in exceptional circumstances. Page limits include references but exclude author's(s') affiliation page, abstract page, tables, and graphs.
- ◆ no more than a total of five tables, graphs, and boxes for research articles and two for research briefs to illustrate major findings. Tables larger than 1 full page will not be considered. Tables and graphs labeled "1a, 1b, 1c," for example, will count as three submissions.
- ◆ acknowledgment of the source of funding for the research.

Style:

The writing style must be more journalistic than that used in purely academic journals. We encourage authors to report descriptive statistics rather than multivariate analyses. We also encourage authors to use the active voice, to avoid jargon, to keep acronyms to a minimum, and to explain any technical terms. To be considered for publication, all manuscripts must follow the guidelines of the *Publication Manual of the American Psychological Association*, 5th edition.

Format:

FENR articles follow this general format: (1) abstract (for research articles only), (2) introduction, (3) background, (4) methods, (5) results, (6) conclusions, (7) acknowledgments, and (8) references.

Tables, boxes, graphs, and other graphics should include titles in bold and sources at the bottom (if the data are from another source). Tables should be arranged to fit vertically (portrait style) on the page and should be done in a word processing program (Word, WordPerfect) by using tabs rather than a table function.

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